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A Closer Look at the Impact of Quantitative Easing on the Capital Markets: GARCH Analysis of the Exchange Traded Funds Market

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Abstract
This paper analyzes the effects of quantitative easing (QE) on the capital markets by modeling exchange traded funds (ETFs) returns using a generalized autoregressive conditional heteroskedasticity (GARCH) methodology. The results show that the 10-Year Treasury yields are significant in the returns of some sectors of the economy more so than others, and the Federal Funds Futures trading volume is significant in all ETFs return volatility. The implications of these results not only provide information about the reaction of the ETF market and QE, but also provide insight for developing investment strategies.

Keywords
Quantitative Easing, QE, Exchange Traded Funds, ETF, Capital markets, Federal Reserve, Monetary Policy, Finance, Investment Analysis, Economic Analysis, Macroeconomics, GARCH, ARCH, Returns, Volatility

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I. Introduction

This paper analyzes the effects of Federal Reserve (FED) actions on the U.S. capital markets. Based on this analysis, we discuss the relationship between FED monetary policy and what reaction the capital markets seem to have from these actions. It is generally accepted that there exists a significant relation between capital market returns and the action of increasing the money supply in the economy, but there is much uncertainty to what degree the FED action is affecting these returns and, more recently, how the capital markets will respond when the FED action comes to a halt. This paper attempts to contribute to this literature by analyzing the relationship of the FED action and the capital markets over recent years.

The Great Recession in the United States began in December 2007 and lasted until June 2009, according to the National Bureau of Economic Research (NBER). The recession not only affected the United States, but also many other countries economies and essentially the world economy. In an attempt to spur and help the recovery from this economic slump, the FED implemented an expansionary monetary policy and started to pump money into the economy. This action by the FED came to be known as quantitative easing (QE). The height of QE was in its third phase when $85 Billion per month was created purchasing open-end bonds. QE, in the three distinct phases, has been in affect from 2009 to the end of 2013 and is now tapering off by $10 Billion per month since January 1, 2014 in accordance to the FED chair Janet Yellen's, evaluation of the economy.

In this paper we take a closer look at the effect QE has had on the capital markets from the time periods leading up to the tapering. To analyze the effects in the capital markets we use exchange-traded funds (ETFs). ETFs are portfolios of stocks much like mutual funds and may be traded in the same manner as stocks. We use ETFs along with daily stock returns to investigate the relationship between QE and these investments on a day-to-day basis. We can see this impact in two different places by modeling the volatility and the actual return of the ETFs. To construct this type of a model we use both arbitrage pricing theory (APT) and what is called a generalized autoregressive conditional heteroskedasticity (GARCH) method where we can measure both daily return and variance of these ETFs. Through this method we do find that QE has an impact on ETF returns and the ETF return volatility during this time period of investigation.

In the next section we will talk about the literature and theoretical framework that help us build our empirical model. In section III we will build our empirical model and discuss the factors we use to capture QE effects. In section IV we will discuss the data that we use in our analysis in more detail. In section V

we will discuss the results we have found and section VI we will discuss the relationship QE has had on ETFs over the years of this FED action.

II. Literature Review & Theoretical Framework

Many previous studies used the CAPM, APT, and GARCH in empirical models to model stock returns[1]. The present empirical model used in our analysis on the impact of FED actions through QE and daily trading volatility of ETFs, is based on these previous studies. The theories of the monetary policy give insight to the variables that would capture the impact on capital markets to model the effects of this FED action.

There are many studies on modeling stock returns that used various methods and models. The theoretical work on stock returns provided an understanding of stock returns and the previous empirical work helped us develop our empirical model used in our study. The earliest of these models is the capital asset pricing model (CAPM), developed by Treynor (1961), Sharpe (1964), and Lintner (1965). Sharpe (1964) develops the CAPM model, which shows that assets returns are directly related to the market:

$$E_i = p + \lambda b_i \ , \tag{1}$$

where E_i is the return on any asset i, p is the riskless rate of interest or U.S. t-bill rate, λ is the expected excess return on the market, E_m, less p, and b_i is the beta coefficient on the market. This is defined as:

$$b_i = \frac{\sigma_{im}^2}{\sigma_m^2} \ , \tag{2}$$

where σ_m^2 is the variance of the market portfolio and σ_{im}^2 is the covariance between the returns on the i th asset and the market portfolio. The beta coefficient, b_i, is a measure of the riskiness of asset i relative to the market. A beta coefficient of 1 means that the asset is just as volatile as the market return so a movement in the market will provide a similar movement in the asset. A beta of less than 1 means it is less volatile than the market so it will move with the market, but to a smaller degree, and a beta greater than 1 is more volatile than the market where the asset moves in a greater degree than the market. Negative beta coefficients indicate that the asset moves in the opposite direction of the market. In perspective the absolute value of a negative coefficient responds in the same magnitudes as the positive coefficients respond, but the asset will move

[1] See, for example, Engle (2001) for some examples.

negatively when the market is positive and positively when the market is negative. A similar model is known as the market model, which relates the assets to the market directly. When working with daily data, excess return and the direct market return models have very minimal differences. The market model was used in multifactor models as seen in: Chen, Roll and Ross (1986), Fama and French (1989), Chen (1991), and many others.

Ross (1976) introduced the arbitrage theory of capital asset pricing known as arbitrage pricing theory (APT). Bodie, Zvi, Kane, and Marcus (2005) say the APT from Ross relies on three key components: a factor model can model returns; there are sufficient securities to diversify idiosyncratic risk; and that well-functioning markets do not allow for opportunistic arbitrage. Ross finds that other factors can be significant in capturing asset returns other than the market alone. From APT we can form multifactor models where a well-diversified portfolio of securities can be modeled with other factors of systematic risk. This theory maybe superior to the CAPM, which maybe best used for individual securities, but since we are looking at ETFs that contain a portfolio of securities in our analysis the APT is valuable to us.

A simple APT factor model can express random returns on a subset of assets:

$$E_i = x_j + \beta_i \delta + \epsilon_i, \tag{3}$$

where E_i is the return on assets *i,* x_j is the return on another asset *j,* δ is a mean zero common factor, and ϵ_i is the error term whose expected value is zero. The β coefficient in this model shows how much of an impact the factor has on the assets returns. For example a coefficient of 0.5 would mean that an increase of 1 unit in the indicator would have a 0.5 increase on the assets return. Many of the intuitive results are retained in the APT from the original theory of the CAPM. The main difference is that whereas the CAPM uses the market return alone, APT uses a risk premium from a number of macroeconomic indicators and the return of any risky asset to model the individual stock return. Ferson and Korajczyk (1995) tested the models that contain single factor models to those that contain multiple factors and found that multiple factor models outperform single factor models when measuring expected return.

By using different macroeconomic variables in the APT model, researchers have been testing different formulations on asset returns to find the best model. Chen, Roll, and Ross (1986) found that; industrial production, changes in risk premium, yield curve twists, unanticipated inflation, and expected inflation are significantly priced in stock returns. Satisfied with the results they had found they go on to say,

> "we do not claim, of course, that we have exhaustively characterized the set of influential macro variables, but the set that was chosen performed well against several other potential pricing variables."[2]

Consumption per capita and an oil index were also modeled but were found to be insignificant in predicting asset returns.

Fama and French (1989) tested variables that reflect business conditions on stock returns and bonds. They used dividend yields, term structure, and default spreads in their model and found dividend yields and default spreads to be highly correlated, thus capturing the same significance in returns. They found that when business condition indicators were high, stock and bond returns were low, and when the indicators were low, returns were higher. Fama and French said,

> "the default spread is a business-conditions variable, high during times like the Great Depression when business is persistently poor and low during periods like 1953-1973 when the economy is persistently strong." [3]

As expected when the economy is doing well the stock markets returns reflect this positively.

Chen (1991) used another set of variables and came to the conclusion that default spread, term spread, the one-month T-bill rate, lagged industrial production growth rate, and the dividend price ratio are significant in determining future stock market returns.

> "We interpret the ability of these variables to forecast future market returns in terms of their correlations with changes in the macroeconomic environment. In particular, we find that these state variables are related to the recent and future growth of GNP (and consumption)." [4]

Using these variables in a model we can see how the growth rate of industrial production from last quarter affects the next quarter's returns, which would be helpful in strategically planning investments for the future using this information.

Fama and French (1992) use key financial statistics within the price of the stock to find correlations among stock indicators. In their results they find, "size and book-to-market captures the cross-sectional variation in average stock returns associated with size, earnings per share (E/P), book-to-market equity, and leverage."[5] They found that the size of the firm and the book-to-market equity has an important significance in average stock market returns.

Levine and Zervos (1998) take an interesting approach where they model the stock market and banking development to predict economic growth. Their findings show that, "stock market liquidity and banking development are both positively and robustly correlated with contemporaneous and future rates of

[2] Chen, Roll, and Ross (1986), pg. 402.
[3] Fama and French (1989), pg. 48.
[4] Chen (1991), pg. 553.
[5] Fama and French (1992), pg. 450.

economic growth, capital accumulation, and productivity growth."[6] Levine and Zervos conclude that financial factors are important to economic growth and that when people are able to invest in a liquid market investments are economically efficient.

Flannery (2002) also uses macroeconomic factors but models it using a generalized autoregressive conditional heteroskedasticity (GARCH) method developed by Bollerslev (1986). The returns and their conditional volatility depend on the announcements of seventeen different macroeconomic indicators. GARCH method is used to correct for the heteroskedastic errors. Since stock return time series data are very volatile and that volatility is often time varying, the assumption of constant error variance is violated, which makes using the ordinary least squares model (OLS) problematic. Engle (2001) developed ARCH models, which was generalized to GARCH by Bollerslev (1986). GARCH models the conditional variance h_t, of a regression model as:

$$h_{t+1} = \omega + \alpha(r_t - m_t)^2 + \beta h_t = \omega + \alpha h_t \varepsilon_t^2 + \beta h_t \,, \qquad (4)$$

where h_t is the conditional variance of residuals of a regression $r_t = m_t + \sqrt{h_t}\varepsilon_t$. Flannery (2001) found that the CPI, PPI, Balance of Trade, Unemployment, Housing Starts, and Monetary Aggregate M1 are strong risk factor candidates. By modeling these daily returns with the GARCH model investors are able to find the volatility of assets based off the announcements of these macroeconomic indicators. Lamoureux and Lastrapes (1990) use daily trading volume as a proxy for information arrival and dissemination. They found that when daily trading volume is included in the variance equation, ARCH effects tend to disappear, which means that daily trading volume accurately measures information arrival. In other words, as people begin to sell off shares it is more likely to be followed by more volume and more selling off.

Given that multifactor models provide more insight into the securities returns, we build a theoretical mean equation formed by the APT where the return of an ETF portfolio E_{it} depends on multiple factors of systematic risk.
This model is shown by equation (5):

$$E_{it} = \beta_0 + \beta_1 F_1 + \beta_2 F_2 + \varepsilon_t \,, \qquad \varepsilon_t \sim iidN\,(0, \sigma^2) \quad (5)$$

where, F_1 and F_2 are theoretical independent variables (or factors) and the beta coefficients capture how much the return of the ETF is captured by the independent variables. ε_t, is the error term, which is assumed to be identically and independently distributed as a normal distribution with zero mean and constant

[6] Levine and Zervos (1998), pg. 554.

variance, σ^2. Engle (2001) found this assumption to be unrealistic especially with security returns because of the distribution of the returns. Distributions of returns have fat tails and are skewed so they are not distributed normally. Additionally, the variances of the returns are time varying, resulting in heteroskedastic error terms. The GARCH methodology models the heteroskedasticity of the error terms using past errors and past conditional variances, in addition to other independent variables. The conditional variance model is shown by equation (6):

$$h_{it} = \alpha_0 + \alpha_1 \varepsilon_{it-1}^2 + \alpha_2 h_{t-1} + \alpha_3 G \ , \tag{6}$$

where h_{it} is the conditional variance of the return of asset i at time t. ε_{it-1}^2 is the once lagged squared error term of asset i, and h_{t-1} is the once lagged variance. The vector G is a subset of theoretical independent factors that affect the variance, and the alpha coefficients capture how much the time varying conditional variance is affected by the variables.

Many of the past empirical models are built to evaluate some sort of objective like how GDP growth or industrial production effects stock returns. To assess the effects of the FED actions in the past years we take a closer look at the theories of monetary policy to find factors that will show the relationship of QE in ETFs. Mankiw (2007) describes monetary policy theory as FED induced increase in the money supply which lowers interest rates and therefore increases income and lowers unemployment. With lower interest rates there is an increase in cash flow because money becomes less expensive to borrow which stimulates investments in the economy. Thus, any FED action regarding the money supply will affect the capital markets.

The National Bureau of Economic Research announced that December 2007 was the start of the U.S. recession known as the Great Recession. The Great Recession officially ended by June 2009, but still showed signs of low economic activity and high unemployment. To increase the output of the economy the Federal Reserve initiated monetary policy QE in November 2008 consisting of purchasing $600 billion dollars in mortgage backed securities (MBS) from banks. In June 2010 the purchase was halted as the Fed reassessed the economic recovery, but then reinitiated a second QE when things were not as they seemed in November 2010. Under the name QE2 there was purchase of $600 billion dollars in Treasury securities by the second quarter of 2011. Still not achieving the expected results in September 2012 QE3, a third round of monetary policy, was announced purchasing $40 billion a month in MBS. In December 2012 the amount was increased to $85 billion dollars a month of open-ended bond purchases (www.nasdaq.com). Lenzner (2011) wrote an article in *Forbes* that QE1 and QE2 had resulted in higher stock prices, but was unsure of what the future beheld. Stock prices grew steadily into 2013 with great earnings from

companies, but will the prices hold as QE3 begins to taper off in 2014? How much of an impact has QE really had on the capital markets since the beginning in 2009?

Bernanke and Kuttner (2004) model monthly unexpected and expected federal funds rates on stock returns to analyze the effects of monetary policy on stock returns in the market. The unexpected factor was an average calculation of the Fed funds rate target less the Fed funds futures contract price of the one-month prior. The expected funds rate change was the difference between the funds futures contract price one-month prior less the funds target rate. In their results they found a consistent and strong relationship between the unexpected monetary policy actions and stock market returns. They also found relationships where monetary policy reactions tended to differ between industry and technology based portfolios.

We find theoretical and empirical evidence that supports the relationship between capital markets, systematic risk, and FED actions of monetary policy. In the empirical section we analyze the impact of the Fed actions through factors we believe have a significant impact on the daily returns and volatility of ETFs. Our hypothesis is that QE directly impacts the ETFs returns and the conditional variance of ETF returns among a daily trading volume proxy for information arrival and dissemination. We define the factors we use in the empirical model and give justification why we use these factors to estimate the effects of QE on the ETF market.

III. Empirical Model

In the empirical analysis of the ETF market and QE we intend to find a strong relationship in the daily returns and volatility. We do this by identifying daily reported factors that will capture effects of the QE action in the mean equation for the return and a conditional variance equation for the daily volatility.

Measuring the relationship of the 10-year treasury yield in the mean equation along with the market return in the model theoretically should show us the systematic risk we obtain from the market as well as the risk from the changing interest rate affected by QE. The 10-year Treasury yield is used because it is essentially affected by the increase of the money supply induced by QE. From theoretical monetary policy the 10-year Treasury yields decrease from the increase of the money supply providing money circulation for borrowers or creditors at a lesser interest cost.

Thus, the mean equation can be specified as:

$$E_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 YT_t + \varepsilon_t \ , \qquad \varepsilon_t \sim iidt\ (0, h_t) \quad (7)$$

where E_{it} is the return on assets *i* during time *t*. R_{mt} is the market return at time *t*, YT_t is the 10-year Treasury yield at time *t* and ε_t is the error term of the variance on trading day *t*. The error term is identically and independently distributed as a student t distribution with zero mean and conditional variance. The beta coefficients show the systematic risk of the factors on the ETF fund return.

By using GARCH we investigate the conditional variance relationship between ETFs and the QE actions as well as the relationship between the trading volume and the ETFs as a proxy for information arrival and dissemination in the funds. GARCH is the best method for the dataset because of the inherent high volatility in the stock return data. The volatility changes over time meaning the dataset violates the homoskedasticity assumption needed to obtain the best linear unbiased estimates (BLUE) in an ordinary least squares model (OLS).
This time varying volatility can be seen in the daily S&P 500 returns shown in Figure 1:

Figure 1: S&P 500 Percent returns, daily data

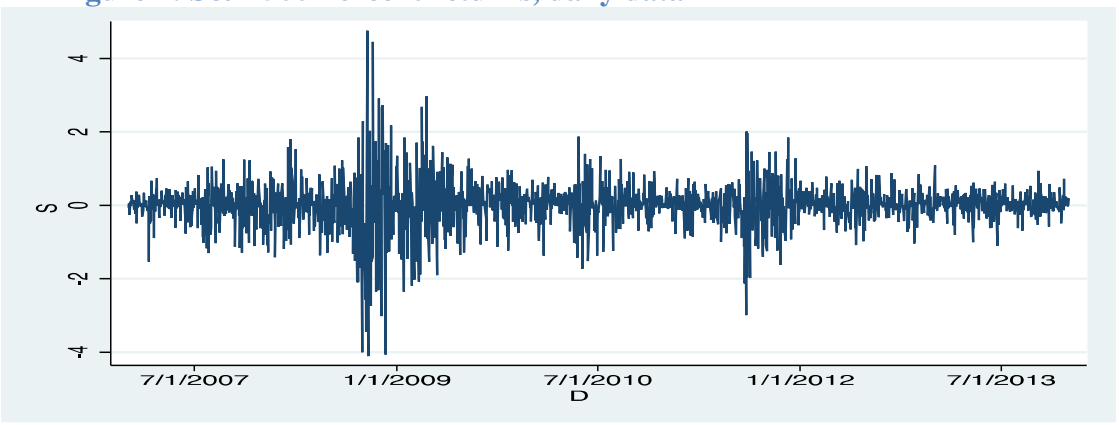


Figure 1 shows a time-series plot for 1,762 market days. The return displays much volatility, or high levels of dispersion. As found by other researchers, high volatility tends to follow other high volatility leading to a time varying dispersion. Therefore, it is clear that the ETF returns cannot be modeled by an empirical methodology that assumes a constant variance, and this leads us to use a methodology that explicitly models the conditional variance.

GARCH and ARCH captures the persistence and time varying properties of the variance with the volatility of the trading day and the daily Federal funds futures trading volume to model ETF trading volatility. The federal funds futures volume is used in the conditional variance equation to measure the impact of QE

since the expectation of future rates cause reactions in the capital markets. Bernanke and Kuttner (2004) use monthly Fed funds futures rates in their mean equation to find the direct impact of monetary policy on market returns. By using daily Fed funds futures volume data we capture the volatility in the market today from the expectation of FED action in the future. The federal fund futures volume gives us insight into the expectation of the future fed funds rates, which will capture the relationship of investor actions in the capital market. This factor will provide QE effects in the volatility since Fed fund rates are affected by this FED action. Thus the variance equation is defined as:

$$h_{it} = \alpha_0 + \alpha_1 h_{it-1} + \alpha_2 \varepsilon^2{}_{it-1} + \alpha_3 VOL_{it} + \alpha_3 FFV_t \ , \qquad (8)$$

where h_{it} is the conditional variance of any asset during time *t,* h_{it-1} is the conditional variance last period that captures the GARCH effects, and $\varepsilon^2{}_{it-1}$ is the squared past residual that should capture ARCH effects. VOL_{it} is the daily trading volume of asset *i* at time *t,* and FFV_t is the Fed fund futures daily trading volume at time *t.* The alpha coefficients tell us the amount of the variance that is affected by each of the factors in the model.

Given the empirical models using GARCH methodology we will be able to determine the significance of the QE factors, used in Equations (7) and (8), and their relationship with the capital markets in the ETF market. In the next section we will discuss how we found the data we used and go into detail about the data obtained pertaining to the basic statistics of the ETFs used in the analysis. We will talk about interesting findings and show figures to express visually the patterns in the data that provide evidence of QE in the factors. Also we will discuss the QE factors we use in more detail to prove why we believe that this is the best approach for our model.

IV. Data

The data used in this paper were found in many different sources, which made it necessary to compile a database of our own to perform our empirical analysis. The ETFs we are using to measure the relationship of QE are fairly new investment vehicles and thus have rather limited historical data, so the size of the dataset became an issue. Since their introduction in 1993 by SPDR S&P 500 (SPY), ETFs have been an attractive alternative to mutual funds because the management fees are much lower than a similar mutual fund and, because they are exchange traded, much easier to buy and sell than mutual funds. Each ETF has a clear investment strategy that is clearly stated in their prospectus. Many ETFs "track" certain stock indexes like the SPY and the SPDR Dow Jones Industrial

Average (DIA), thus ETFs are commonly found to divide sectors of the economy, and also small, medium or large cap stocks. There are also ETFs that are built in short investment vehicles, like the Proshares Short S&P 500 (SH), where an investor can take advantage of a down market.

Using ETFs we can easily divide them into sectors to analyze these relationships across the economy more specifically. As Bernanke and Kuttner (2004) found, reactions in the market to FED actions differed in industrial and technology-based portfolios. To get robust results we separated ETFs into six sectors that provide a broad view of the U.S. economy. These six sectors are: energy, housing, financial, retail, technology, and industrial-based.

We were able to find our ETFs from the database maintained by Fidelity, an online brokerage catering to personally managed assets and investments. They have many different research tools to analyze different investment vehicles and provide information recommended by their professional analysts. The screening tool is a filter search where we added a filter to find ETFs with an inception date before January 1, 2007. This date was chosen to capture ETFs with at least seven years of historical data and also capture the recent years of QE beginning in 2009. Also starting the analysis with 2007 we are able to capture the beginning of the Great Recession and the time period after when QE was initiated to view the resulting effect of the monetary policy. Using this filter we were able to obtain 318 funds. This gives us 1,762 daily observations for each fund compared to 84 observations if we were to use monthly data, which would be a weaker analysis given the number of observations. We also acquired the ETFs sponsor and the investment objective and then collected the historical price and volume data from Yahoo Finance. Using the closing prices of the selected ETFs we made a database of the continuously compounded daily returns, R_{it}, by calculating:

$$R_{it} = (logP_t - logP_{t-1}) * 100 \ , \tag{9}$$

where $logP_t - logP_{t-1}$ is the natural logarithmic difference between the closing price of day *t* and the day before. Then we multiply the difference by 100 to get a daily percent return. The volume data was very large on a daily basis so we divided the daily trading volume by 100,000 to scale the data.

To look closer at the return data we chose four ETFs in each of the six different chosen sectors of the economy to discuss in the paper and all the ETFs can be viewed in the appendix. The four ETFs in the sectors are among the largest top ETF providers, which are Spyder Shares, IShares, Vanguard Shares and Powershares. The descriptions of all the selected ETFs discussed in this paper along with their inception dates and net assets are reported in Table 1 below. Similar descriptions of all of the ETFs in our data are reported in Table A1 in the appendix.

Table 1: Selected ETF descriptions

Variable	Inception	Description	Net Assets[1]
		A. Market Index	
SPY	1/22/93	SPDR S&P 500 ETF	$158,180
		B. Energy Sector	
XLE	12/16/98	Select Sector SPDR Energy	8,430
IYE	6/12/00	IShares U.S. Energy ETF	2,030
VDE	9/23/04	Vanguard Energy ETF	3,130
PXI	10/12/06	Powershares Dynamic Energy	131.23
		C. Housing Sector	
XHB	1/31/06	SPDR S&P Homebuilders ETF	2,310
ITB	5/1/06	IShares U.S. Home Construction ETF	1,820
VNQ	9/23/04	Vanguard REIT ETF	38,410
PKB	10/26/05	Powershares Building & Construction	114.14
		D. Financial Sector	
XLF	12/16/98	Select Sector SPDR Financial	17,190
IYF	5/22/00	IShares U.S. Financials ETF	1,520
VFH	1/26/04	Vanguard Financials ETF	2,050
PFI	10/12/06	Powershares Dynamic Financial Sector	31.28
		E. Retail Sector	
XLP	12/16/98	Select Sector SPDR-Consumer Staples	5,600
IYK	6/12/00	IShares U.S. Consumer Goods ETF	452.69
VDC	1/26/04	Vanguard Consumer Staples ETF	1,810
PMR	10/26/05	Powershares Dynamic Retail	28.29
		F. Technology Sector	
XLK	12/16/98	Select Sector SPDR-Technology	12,140
IYW	5/15/00	IShares U.S. Technology ETF	3,790
VGT	1/26/04	Vanguard Information Technology ETF	5,250
PTF	10/12/06	Powershares Dynamic Technology	17.02
		G. Industrial Sector	
XLI	12/16/98	Select Sector SPDR-Industrial	9,030
IYJ	6/12/00	IShares U.S. Industrials ETF	1,290
VIS	9/23/04	Vanguard Industrial ETF	1,720
PRN	10/12/06	Powershares Dynamic Industrial	105.92

[1]In millions of dollars as of Feb, 28 2014.

The table reports the ETF inception dates, which are when they first started, the description of the ETF, and net assets. The sample is separated by six sectors of the economy and provides four among the largest ETF suppliers in each sector.

The net assets column is a difference of the total assets less any liabilities of the portfolio and gives a measure of the size of the ETF. We find that in general ETFs with a longer history tend to have a higher value of net assets. When we look closer at the ETF return statistics we also see this relationship of longer history and higher average daily volume traded.

The descriptive statistics, including the return and volume statistics of each ETF, are displayed in Table 2 on the next page. The mean of the ETFs are the average daily percent return during the time period between January 1, 2007 and December 31, 2013. It is understandable that the mean for the market index, S&P 500, is the same as the SPDR S&P 500 ETF (SPY) because SPY is a portfolio that tracks the S&P 500. In addition, it is interesting but not surprising given our sample period of the post financial crisis age that the financials and the housing sectors have negative average returns, both for the majority of the ETFs and the sector averages.

It is worth pointing out how every one of our sample selection of ETFs have highly skewed and kurtotic distributions. Skewness is as high as -20.52 for IShares US Energy ETF (IYE) and kurtosis, a measure of tail thickness, is as high as 675.11, also for IYE. These statistics indicate that the underlying probability distributions for our ETF returns are highly unlikely to be a normal distribution. Also, we can see that sectors containing ETFs whose returns are closest to the sector average are the retail and industrial sectors. This could be explained by the fact that the ETFs for these sectors are not as volatile compared to a sector like the housing sector, which was a major influence in the banking credit crisis. The standard deviations of the retail sector are much lower than those of the housing sector. This means the returns in the retail sector are not as volatile as the housing sector.

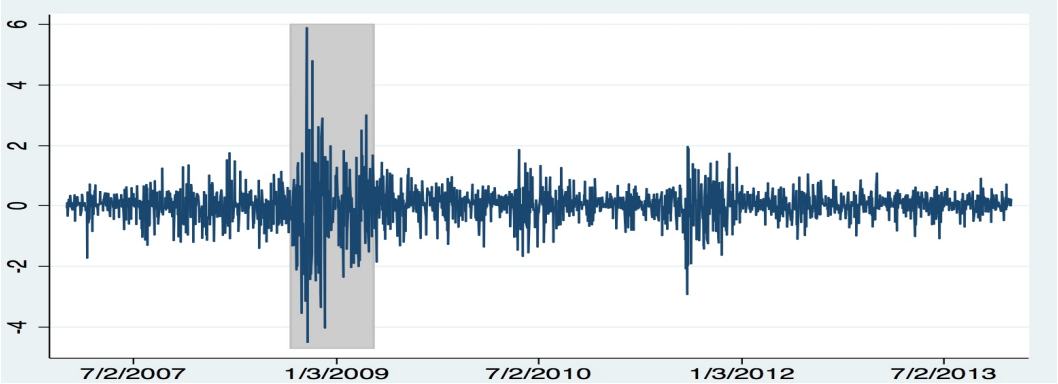
Table 2: ETF Return and volume descriptive statistics

Variable[1]	Mean	Std. Deviation	Skewness	Kurtosis	Average Volume[2]
S&P 500	.007	0.64	-0.30	8.55	-----
SPY	.007	0.64	-0.06	11.26	2000
10 Year Treasury	3.087	0.95	0.14	-0.89	-----
Fed Funds Futures	-----	-----	-----	-----	0.467
A. Energy Sector					
XLE	0.010	0.911	-0.53	10.13	208
IYE	-0.017	1.45	-20.52	675.11	6.062
VDE	0.010	0.90	-0.57	10.13	1.476
PXI	0.017	0.94	-0.87	9.21	0.248
Sector Average[3]	0.002	-----	-3.19	94.99	23.39
B. Housing Sector					
XHB	-0.003	1.11	0.05	2.50	61.42
ITB	-0.013	1.23	0.07	2.81	15.447
VNQ	-0.004	1.14	-0.20	9.08	22.451
PKB	0.008	0.87	-0.35	4.20	0.369
Sector Average[3]	-0.005	-----	-0.19	7.07	35.449
C. Financial Sector					
XLF	-0.013	1.14	-0.05	9.09	954
IYF	-0.009	1.02	-0.10	8.39	23.870
VFH	-0.010	1.02	-0.10	8.61	2.574
PFI	0.003	0.77	-0.08	7.33	0.080
Sector Average[3]	-0.006	-----	-0.07	8.71	66.955
D. Retail Sector					
XLP	0.012	0.41	-0.34	5.43	60.920
IYK	0.012	0.49	-0.18	8.10	0.497
VDC	0.013	0.43	-0.22	8.08	0.755
PMR	0.014	0.69	0.07	2.50	0.367
Sector Average[3]	0.013	-----	-0.27	6.43	12.973
E. Technology Sector					
XLK	0.011	0.64	0.08	8.46	83.369
IYW	0.012	0.65	-0.10	4.99	2.726
VGT	0.013	0.65	-0.14	5.10	1.700
PTF	0.008	0.67	-0.42	3.43	0.100
Sector Average[3]	0.009	-----	-0.23	4.47	5.108
F. Industrial Sector					
XLI	0.010	0.69	-0.23	4.92	121
IYJ	0.011	0.69	-0.44	4.65	1.140
VIS	0.010	0.72	-0.40	4.59	0.766
PRN	0.014	0.77	-0.71	7.99	0.237
Sector Average[3]	0.011	-----	-0.42	5.35	13.896

[1] Variable Description in Table 1.
[2] In 100,000 shares.
[3] Sector Average over all listed ETFs under the specified category.
This table reports the average return of each ETF in the mean column, the standard deviation, and average daily trading volume. Also skewness and kurtosis are presented to show the non-normal distributions of ETFs supporting the method of GARCH in our model.

We can compare the return pattern of S&P 500 shown in Figure 1 to the pattern of SPY shown in Figure 2.

Figure 2: SPDR S&P 500 ETF (SPY) Percent returns, daily data



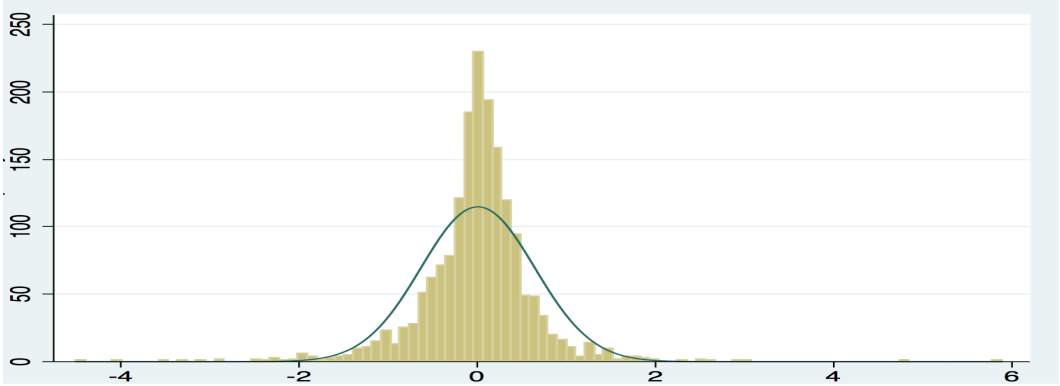
As we can visually see the returns over time, the ETF SPY almost completely matches the return patterns of the S&P 500 market index. An interesting spike in the return that we find in all the ETFs, and the market index, is shown in the shaded region between the time periods of September 2008 and January 1, 2009. Twin (2008) talks about these spikes on CNN Money. On September 29, 2008 the S&P 500 declined by 8.8 percent, which was said to be, "the biggest one-day percentage drop since the crash of '87."[7] This decline in the market was from when the House rejected a bank bailout of $700 Billion, which resulted in approximately a $1.2 Trillion market value loss. About 3 weeks later on October 13, 2008 the stock market was up when Twin wrote about, *"The Raging Bulls."* The S&P 500 was up by 11.6 percent as reports that investor's bet that the worst of the credit crisis was over and there was good news about global initiatives. Then a few days later on December 1, 2008 Twin wrote that the U.S. recession was officially called. Future expectations were for a prolonged economic slowdown and the S&P index was down by 8.9 percent. This was the time for the FED to come in and initiate monetary policy so the economic slowdown would not last as long as was expected.

In the skewness column of Table 2 we see for the most part that ETFs are negatively skewed which tells us that the peak of the distribution is not of the center at the mean of zero. In the kurtosis column, where normal kurtosis statistics would present a value of zero, all the ETFs are at least over 2. This is expected for ETF returns since kurtosis is a measure of the thickness of the tails in a distribution curve. Stock returns have thicker tails and are skewed more than the normal distribution and ETF returns are no exception. Figure 3 below shows the

[7] Twin (2008), "Stocks Crushed."

dispersion plot of SPY ETF returns with a normal distribution superimposed. It can clearly be seen that SPY ETF returns are skewed when compared to a normal distribution which is symmetric.

Figure 3: SPY Frequency distribution with normal density curve



In the figure we see that the SPY ETF returns have a much higher peak and have higher frequency on the left from the mean zero. We also see that the tails are not approaching zero as they move away from the center. The distribution of the ETF is skinny as well, so with the left sided skewness and fat tails we would say that the returns are non-normally distributed. If the ETF were to be normally distributed it would portray the curve overlaid in the graph above but we can visually see that the returns do not match this curve.

To analyze the effects of QE on the capital markets we found factors that would both influence the return of the data directly and through the conditional variance of the ETF. The 10-year Treasury yield is affected by the manipulation of the Fed Funds rate and the increase of the money supply in the economy as talked about before. As the money supply is increased in the economy this results in lower interests rates and higher quantity demanded for money in the market. In result people will save less in the bonds market because they earn a lower rate of interest. The historical data was also found from Yahoo Finance. This Treasury yield also affects how investors will leverage themselves to make investments where they can find a higher return than the interest they owe on money they borrow.

As we can see in Figure 4, the 10-year treasury yields display patterns that reflect QE.

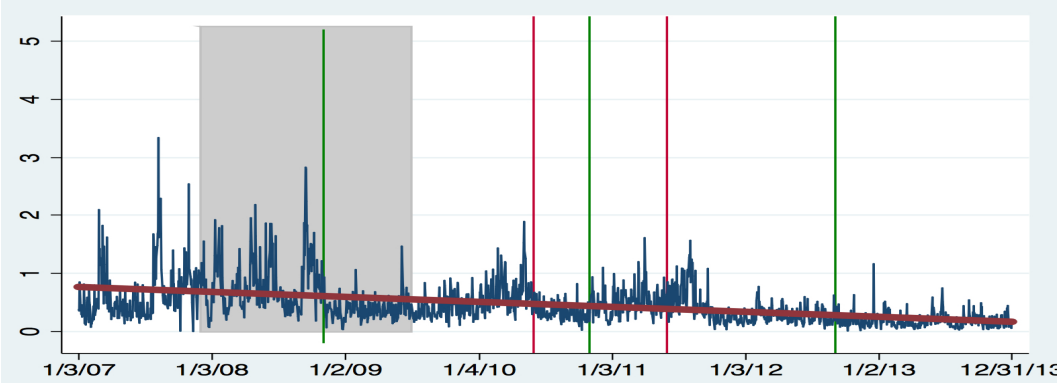
Figure 4: Daily 10 Year-Treasury percent yield

The pattern over the years during QE shows that the yield has been decreasing overall, which is what we would expect to see given the expansionary nature of QE. In the Figure the shaded region is the recessionary period during the financial crisis. The green bars represent the start of QE implementation from QE 1, 2, and 3, respectively. The red bars denote the ending periods of each QE cycle.

To capture the effect of QE on the conditional variance, we took the Fed fund futures trading volume data from Fed funds futures rates. The Fed funds futures trading volume data was acquired from the Chicago Mercantile Exchange (CME) Group datamine who trade futures and other derivative market investments. The Fed funds futures volume is also expressed in 100,000's in our analysis.

In Figure 5 we can see a pattern showing QE trends in the Fed Funds Futures volume data and the similar important time denotations as in Figure 4.

Figure 5: Daily Fed fund futures trading volume



The Fed Funds Futures trading volume was very high before the recession was announced and until the announcement of QE 1. During this high volatility period there was uncertainty in the market and when QE 1 was announced immediately we see somewhat calm and consistent volatility there after, but still a variance in the existing volatility.

Using the data acquired for the empirical research and understanding the basic information that can be told by this information we have built the relationships that support the evidence to use our factors in such a model. We expect there to be a strong relationship between the returns of ETFs and 10 Year Treasury-yields, as well as a strong relationship in the conditional variance and the trading volume of Fed funds futures. In the next section we will discuss the results found from our empirical model in great detail. These results will provide us evidence whether or not to support our hypotheses about FED action and the capital markets.

V. Results:

The GARCH empirical model outlined in section III was estimated for our ETF data using STATA software. The results are presented in Table 3. We find highly significant results in both the returns equation and the variance equation indicating that our model captures the reaction of the ETF market from QE. The S&P 500 is very significant in all the ETFs meaning that the market risk is significant in the ETF returns. For example, as the S&P 500 daily return increases by 1% than we should see a 1.16% increase in the XLE ETF daily return. Also in the returns equation we find that our QE factor measured by the 10-Year Treasury yield is significant in some sectors, but not significant in others. The 10-Year Treasury yield is significant in the first half of Table 3 and not very significant in the second. Here we can see that there are specific sectors that are affected more by a change in the interest rate than others. In the second half of Table 3 Retail, Technology, and Industrial sectors are not significant, but this would intuitively make sense because consumers do not tend to change their consumption of retail items and food from a change in interest rates. Also in technology and industrial portfolios we would expect to see the returns of these ETFs to change from innovative changes within the sector rather than lower interest rates alone. However, in panels B, C, and D, we would expect to see significance in 10-Year Treasury yields in the Energy, Housing, and Financial sectors. When interests rates decrease by 1%; ETF ITB in the Housing sector increases by 0.07% in the return. When interest rates are low the housing market is greatly affected as consumers can attain new property with lower interest rates taking out a home mortgage.

Table 3: Empirical model results

	Returns Equation $R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 10YRT_t + \varepsilon_t$		Variance Equation $h_{it} = \alpha_0 + \alpha_1 VOL_{it} + \alpha_2 FFV_t + \alpha_3 \varepsilon_{t-1}^2 + \alpha_4 h_{t-1}$						
Variable	**S&P 500**	**10 Yr. Treasury**	**Volume[1]**	**Fed Funds Futures Volume[1]**	**ARCH (1)**	**GARCH (1)**	**Wald Test**	**Volatility Test**	**Fed Action Test**
A. Market Index									
SPY	0.99***	0.00	0.00***	1.26***	6323.63	0.29***	308751.57***	45.977***	8.759**
B. Energy Sector									
XLE	1.16***	0.03***	0.01***	0.12	0.07***	-0.04	3905.63***	173.98***	7.97**
IYE	1.15***	0.02***	0.11***	0.43***	-0.00	0.01	6297.75***	192.80***	9.53***
VDE	1.20***	0.02***	0.26***	1.43***	0.37***	0.37***	7571.37***	21.22***	18.82***
PXI	1.20***	0.02**	0.56	1.60***	0.39***	0.48**	6521.01***	14.03***	13.53***
C. Housing Sector									
XHB	1.39***	-0.05***	0.02***	0.98***	0.25***	0.05***	4199.51***	97.25***	30.17***
ITB	1.46***	-0.07***	0.01***	1.23***	0.30***	0.41***	3403.86***	15.16***	21.67***
VNQ	1.21***	-0.01	0.03***	1.41***	0.46***	0.36***	4382.51***	20.74***	13.56***
PKB	1.28***	0.00	0.41**	0.59*	0.27***	0.52***	9622.66***	4.65*	1.76
D. Financial Sector									
XLF	1.30***	-0.02***	0.00***	0.25	0.05***	0.00	7297.25***	241.56***	6.34**
IYF	1.27***	-0.02***	0.03***	1.04***	0.10***	0.00	12836.82***	189.43***	37.57***
VFH	1.27***	-0.02***	0.27***	1.41***	0.27***	0.00	12932.32***	68.77***	49.89***
PFI	1.05***	-0.01	1.87***	0.95***	0.41***	0.34***	7886.54***	15.10***	9.69***

[1] In 100,000 shares

*, **, ***, are statistically significant at the 10%, 5%, 1% level respectively

Table 3: Empirical model results (continued)

	Returns Equation $R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 10YRT_t + \varepsilon_t$		Variance Equation $h_{it} = \alpha_0 + \alpha_1 VOL_{it} + \alpha_2 FFV_t + \alpha_3 \varepsilon_{t-1}^2 + \alpha_4 h_{t-1}$						
Variable	**S&P 500**	**10 Yr. Treasury**	**Volume[1]**	**Fed Funds Futures Volume[1]**	**ARCH (1)**	**GARCH (1)**	**Wald Test**	**Volatility Test**	**Fed Action Test**
E. Retail Sector									
XLP	0.55***	0.00	0.01***	1.16***	0.31***	0.39***	5550.61***	27.97***	16.56***
IYK[2]	0.71***	0.00		1.30***	0.25***	0.62***	16977.87***	8.09**	8.35**
VDC	0.59***	0.00	0.59***	0.62***	0.14*	-0.02	7130.06***	27.49***	12.34***
PMR	0.96***	-0.02*	0.04	1.22***	0.23***	0.53***	4905.44***	11.53***	14.37***
F. Technology Sector									
XLK	0.92***	0.01*	0.00*	1.29***	0.22***	0.46***	14976.32***	20.05***	20.43***
IYW	0.96***	0.01*	0.11***	0.43***	0.22***	0.01	12062.38***	12.13***	6.79**
VGT	0.97***	0.01	0.05	1.18***	0.23*	0.61	14761.17***	7.49**	8.11**
PTF	0.95***	0.00	0.48	1.25*	0.27***	0.67***	6869.35***	4.01	3.74
G. Industrial Sector									
XLI	1.08***	0.00	0.00**	1.41***	0.32***	0.43***	18168.03***	17.45***	17.00***
IYJ	1.08***	0.00	0.05	1.22***	0.23***	0.57***	28365.65***	9.55***	10.36***
VIS	1.12***	0.00	0.34***	0.85***	0.16***	0.21**	24217.54***	17.92***	14.16***
PRN	1.11***	0.00	-0.05	0.83***	0.24***	0.13	12080.51***	10.82***	10.92***

[1] In 100,000 shares

[2] IYK was modeled without the volume factor to reach an uphill direction in the likelihood approximation

*, **, ***, are statistically significant at the 10%, 5%, 1% level respectively

The results from the variance equation show that the model was very significant in capturing the volatility of our ETFs. In all the ETFs we found the daily trading volume significant where the assimilation of information from the stocks within the portfolios is captured in the daily trading of the ETFs. Also our QE factor in the variance equation was highly significant in all 318 ETFs. The Fed Funds Futures trading volume significantly captures the information of QE in to the ETF volatility and since it is futures trading volume this shows the expectation of QE in the ETF volatility. The trading volume is in 100,000 shares, so as the Fed Futures trading volume increases by 100,000 than there will be an increase in the SPY ETF variance of 126,000. The ARCH and GARCH terms are significant in capturing the persistence of the conditional variance and the Wald test shows that jointly the terms are highly significant in capturing the persistence using likelihood statistics. We also tested to see if both of our factors in the variance equation other than GARCH terms are significant in jointly capturing the time varying volatility. To do so, our volatility test uses a likelihood ratio test where our null hypothesis is that the factors have zero affect on the conditional variance. We reject our null hypothesis and find that with the trading volume and the Fed Funds Futures trading volume in the variance equation significantly captures the ETFs volatility. With the fed action test we used the same method, but in this case our null hypothesis was that the 10-Year Treasury yield has no affect in the mean equation and the Fed Funds Futures trading volume has no affect in the variance equation. We reject this null hypothesis and find the factors are very significant in capturing both the reaction of the ETFs in the return and the volatility.

With the results from our model we find that our hypothesis holds and that the ETF market has a reaction to QE in both their returns and volatility. In the conclusion section we will make our last remarks of our findings in regards to the reactions we have found. Also we will talk about the implications that our results obtain in regards to investment strategies.

VI. Conclusion and Implications

In our empirical results we found a strong relationship between the ETF returns and the QE in the Energy, Financial, and Housing sectors. In other sectors the direct impact on the returns were less significant. Therefore, QE does impact the returns of ETFs but in some sectors more so than others. We also found that there is a strong relationship between Fed Funds Futures trading volume and the volatility of all 318 ETF returns in this analysis. QE affects the volatility of all ETFs indicating the assimilation of important information regarding the FED action and intent was occurring in the capital markets.

We find this result to be important in technical analysis of the performance in the ETF market. However, it might be difficult to earn excessive returns with this information alone. This is because ETFs are also affected by other economic factors and fundamental factors regarding the performance of the stocks within the ETFs. To earn excess returns we would want to perform further research of these ETFs where we could account the future performance of the economy, which could either have negative or positive affects on the ETFs depending on economic conditions. The information we have found is useful to use since there is a significant reaction. The fact that the FED will be tapering QE causing interest rates to rise is interesting because we now know the impact interest rates have on ETFs. They will want to effectively moderate the tapering process with the improvement of the economy so the process will not have impeding negative affects on ETFs and therefore the capital markets.

Appendix:

Table A1. ETF Descriptions, Full Sample

Symbol	Inception	ETF Description	Net Assets
SPY	1/22/93	SPDR S&P 500 ETF	157.18B
MDY	5/4/95	SPDR S&P MIDCAP 400 ETF	15.96B
EWA	3/12/96	ISHARES MSCI-AUSTRALIA ETF	1.77B
EWC	3/12/96	ISHARES MSCI CANADA ETF	3.03B
EWD	3/12/96	ISHARES MSCI SWEDEN ETF	567.80M
EWG	3/12/96	ISHARES MSCI GERMANY ETF	5.96B
EWH	3/12/96	ISHARES MSCI HONG KONG ETF	1.93B
EWI	3/12/96	ISHARES MSCI ITALY CAPPED ETF	1.30B
EWJ	3/12/96	ISHARES MSCI JAPAN ETF	14.03B
EWK	3/12/96	ISHARES MSCI BELGIUM CAPPED ETF	74.81M
EWL	3/12/96	ISHARES MSCI SWITZERLAND CAPPED ETF	1.09B
EWM	3/12/96	ISHARES MSCI MALAYSIA ETF	761.10M
EWN	3/12/96	ISHARES MSCI NETHERLANDS ETF	266.12M
EWO	3/12/96	ISHARES MSCI AUSTRIA CAPPED ETF	92.21M
EWP	3/12/96	ISHARES MSCI SPAIN CAPPED ETF	1.59B
EWQ	3/12/96	ISHARES MSCI FRANCE ETF	379.14M
EWS	3/12/96	ISHARES MSCI SINGAPORE ETF	984.69M
EWU	3/12/96	ISHARES MSCI UNITED KINGDOM ETF	4.24B
EWW	3/12/96	ISHARES MSCI MEXICO CAPPED ETF	2.67B
DIA	1/13/98	SPDR DOW JONES INDUSTRIAL AVERAGE ETF	11.55B
XLB	12/16/98	MATERIALS SELECT SECTOR SPDR ETF	5.09B
XLE	12/16/98	SELECT SECTOR SPDR-ENERGY	8.97B
XLF	12/16/98	SELECT SECTOR SPDR-FINANCIAL	18.69B
XLI	12/16/98	SELECT SECTOR SPDR-INDUSTRIAL	8.81B
XLK	12/16/98	SELECT SECTOR SPDR-TECHNOLOGY	12.44B
XLP	12/16/98	SELECT SECTOR SPDR-CONSUMER STAPLES	5.42B
XLU	12/16/98	SELECT SECTOR SPDR-UTILITIES	5.22B
XLV	12/16/98	SELECT SECTOR SPDR-HEALTH CARE	9.37B
XLY	12/16/98	SELECT SECTOR SPDR-CONSUMER DISCRETIONARY	5.65B
QQQ	3/10/99	POWERSHARES QQQ	-----
EWY	5/9/00	ISHARES MSCI SOUTH KOREA CAPPED ETF	4.20B
IVV	5/15/00	ISHARES CORE S&P 500 ETF	53.91B
IWB	5/15/00	ISHARES RUSSELL 1000 ETF	8.90B
IYW	5/15/00	ISHARES U.S. TECHNOLOGY ETF	3.83B
IJH	5/22/00	ISHARES CORE S&P MID-CAP ETF	20.62B
IJR	5/22/00	ISHARES CORE S&P SMALL-CAP ETF	14.17B
IVE	5/22/00	ISHARES S&P 500 VALUE ETF	6.66B
IVW	5/22/00	ISHARES S&P 500 GROWTH ETF	9.89B
IWD	5/22/00	ISHARES RUSSELL 1000 VALUE ETF	21.29B
IWF	5/22/00	ISHARES RUSSELL 1000 GROWTH ETF	22.99B
IWM	5/22/00	ISHARES RUSSELL 2000 ETF	28.53B
IWV	5/22/00	ISHARES RUSSELL 3000 ETF	5.56B
IYF	5/22/00	ISHARES U.S. FINANCIALS ETF	1.60B
IYZ	5/22/00	ISHARES U.S. TELECOMMUNICATIONS ETF	545.11M

Symbol	Inception	ETF Description	Net Assets
IDU	6/12/00	ISHARES U.S. UTILITIES ETF	629.55M
IYC	6/12/00	ISHARES US CONSUMER SERVICES ETF	475.32M
IYE	6/12/00	ISHARES U.S. ENERGY ETF	2.21B
IYG	6/12/00	ISHARES U.S. FINANCIAL SERVICES ETF	649.30M
IYH	6/12/00	ISHARES U.S. HEALTHCARE ETF	2.80B
IYJ	6/12/00	ISHARES U.S. INDUSTRIALS ETF	946.13M
IYK	6/12/00	ISHARES U.S. CONSUMER GOODS ETF	457.30M
IYM	6/12/00	ISHARES U.S. BASIC MATERIALS ETF	932.46M
IYR	6/12/00	ISHARES U.S. REAL ESTATE ETF	4.58B
IYY	6/12/00	ISHARES DOW JONES U.S. ETF	886.29M
EWT	6/20/00	ISHARES MSCI TAIWAN ETF	2.96B
EWZ	7/10/00	ISHARES MSCI BRAZIL CAPPED ETF	4.25B
IJJ	7/24/00	ISHARES S&P MIDCAP 400 VALUE ETF	3.72B
IJK	7/24/00	ISHARES S&P MIDCAP 400 GROWTH ETF	4.67B
IJS	7/24/00	ISHARES S&P SMALLCAP 600 VALUE ETF	3.20B
IJT	7/24/00	ISHARES S&P SMALLCAP 600 GROWTH ETF	2.87B
IWN	7/24/00	ISHARES RUSSELL 2000 VALUE ETF	5.97B
IWO	7/24/00	ISHARES RUSSELL 2000 GROWTH ETF	6.36B
IWW	7/24/00	ISHARES RUSSELL 3000 VALUE ETF	587.71M
IWZ	7/24/00	ISHARES RUSSELL 3000 GROWTH ETF	472.62M
EZU	7/25/00	ISHARES MSCI EMU ETF	10.28B
IEV	7/25/00	ISHARES EUROPE ETF	3.25B
DGT	9/25/00	SPDR GLOBAL DOW ETF	111.20M
SLYG	9/25/00	SPDR S&P 600 SMALL CAP GROWTH ETF	393.24M
SLYV	9/25/00	SPDR S&P 600 SMALL CAP VALUE ETF	276.08M
SPYG	9/25/00	SPDR S&P 500 GROWTH ETF	349.60M
SPYV	9/25/00	SPDR S&P 500 VALUE ETF	174.39M
MTK	9/25/00	MORGAN STANLEY TECHNOLOGY ETF	221.97M
THRK	10/4/00	SPDR RUSSELL 3000 ETF	580.13M
OEF	10/23/00	ISHARES S&P 100 ETF	4.01B
IOO	12/5/00	ISHARES GLOBAL 100 ETF	1.61B
ICF	1/29/01	ISHARES COHEN & STEERS REIT ETF	2.58B
IBB	2/5/01	ISHARES NASDAQ BIOTECHNOLOGY ETF	4.92B
IGM	3/13/01	ISHARES NORTH AMERICAN TECH ETF	696.26M
RWR	4/23/01	DJ WILSHIRE REIT ETF	2.38B
VTI	5/24/01	VANGUARD TOTAL STOCK MARKET ETF	323.75B
IGN	7/10/01	ISHARES NORTH AMERICAN TECH-MULTIMEDIA NETWORKING ETF	332.10M
IGV	7/10/01	ISHARES NORTH AMERICAN TECH-SOFTWARE ETF	1.30B
IWP	7/17/01	ISHARES RUSSELL MIDCAP GROWTH ETF	4.86B
IWR	7/17/01	ISHARES RUSSELL MIDCAP ETF	9.91B
IWS	7/17/01	ISHARES RUSSELL MIDCAP VALUE ETF	5.72B
EFA	8/14/01	ISHARES MSCI EAFE ETF	53.96B
IGE	10/22/01	ISHARES NORTH AMERICAN NATURAL RESOURCES ETF	2.22B
ITF	10/23/01	ISHARES JAPAN LARGE-CAP ETF	88.23M
EPP	10/25/01	ISHARES MSCI PACIFIC EX JAPAN ETF	2.85B
ILF	10/25/01	ISHARES LATIN AMERICAN 40 ETF	941.42M

Symbol	Inception	ETF Description	Net Assets
IXC	11/12/01	ISHARES GLOBAL ENERGY ETF	1.03B
IXG	11/12/01	ISHARES GLOBAL FINANCIAL ETF	308.06M
IXN	11/12/01	ISHARES GLOBAL TECH ETF	706.22M
IXP	11/12/01	ISHARES GLOBAL TELECOM ETF	481.70M
IXJ	11/13/01	ISHARES GLOBAL HEALTHCARE ETF	1.14B
VXF	12/27/01	VANGUARD EXTENDED MARKET VIPERS ETF	38.33B
IEF	7/22/02	ISHARES 7-10 YEAR TREASURY BOND ETF	4.36B
LQD	7/22/02	ISHARES IBOXX $ INVESTMENT GRADE CORPORATE BOND ETF	16.64B
SHY	7/22/02	ISHARES 1-3 YEAR TREASURY BOND ETF	7.86B
TLT	7/22/02	ISHARES 20+ YEAR TREASURY BOND ETF	3.21B
FEU	10/15/02	SPDR STOXX EUROPE 50 ETF	229.39M
FEZ	10/15/02	SPDR EURO STOXX 50 ETF	5.24B
ADRA	11/13/02	BLDRS ASIA 50 ADR	-----
ADRD	11/13/02	BLDRS DEVELOPED MARKET 100 ADR	-----
ADRE	11/13/02	BLDRS EMERGING MKTS 50 ADR	-----
ADRU	11/13/02	BLDRS EUROPE 100 ADR	-----
EZA	2/3/03	ISHARES MSCI SOUTH AFRICA ETF	519.48M
EEM	4/7/03	ISHARES MSCI EMERGING MARKETS ETF	31.75B
RSP	4/24/03	GUGGENHEIM S&P EQUAL WEIGHT	7.09B
PWC	5/1/03	POWERSHARES ETF DYNAMIC MARKET	181.91M
PWO	5/1/03	POWERSHARES ETF DYNAMIC OTC	-----
FVL	6/12/03	FIRST TRUST VALUE LINE 100 ETF	58.60M
FVD	8/19/03	FIRST TRUST VALUE LINE DIVIDEND INDEX	828.85M
AGG	9/22/03	ISHARES CORE TOTAL U.S. BOND MARKET ETF	16.17B
ONEQ	9/25/03	FIDELITY NASDAQ COMPOSITE INDEX TRACK	-----
IYT	10/6/03	ISHARES TRANSPORTATION AVERAGE ETF	859.82M
DVY	11/3/03	ISHARES SELECT DIVIDEND ETF	13.09B
TIP	12/4/03	ISHARES TIPS BOND ETF	12.78B
ITOT	1/20/04	ISHARES CORE S&P TOTAL U.S. STOCK MARKET ETF	1.19B
VAW	1/26/04	VANGUARD MATERIALS ETF	1.34B
VB	1/26/04	VANGUARD SMALL CAP ETF	47.01B
VBK	1/26/04	VANGUARD SMALL CAP GROWTH ETF	15.86B
VBR	1/26/04	VANGUARD SMALL CAP VALUE ETF	12.94B
VCR	1/26/04	VANGUARD CONSUMER DISCRETIONARY ETF	1.36B
VDC	1/26/04	VANGUARD CONSUMER STAPLES ETF	1.89B
VFH	1/26/04	VANGUARD FINANCIALS ETF	2.16B
VGT	1/26/04	VANGUARD INFORMATION TECHNOLOGY ETF	5.32B
VHT	1/26/04	VANGUARD HEALTHCARE ETF	3.41B
VO	1/26/04	VANGUARD MID-CAP INDEX ETF	49.72B
VPU	1/26/04	VANGUARD UTILITIES ETF	1.99B
VTV	1/26/04	VANGUARD VALUE ETF	29.61B
VUG	1/26/04	VANGUARD GROWTH ETF	38.02B
VV	1/27/04	VANGUARD LARGE CAP ETF	8.51B
NY	3/29/04	ISHARES NYSE 100 ETF	68.47M
NYC	3/30/04	ISHARES NYSE COMPOSITE ETF	71.89M
JKD	6/28/04	ISHARES MORNINGSTAR LARGE-CAP ETF	458.88M
JKE	6/28/04	ISHARES MORNINGSTAR LARGE-CAP GROWTH ETF	527.89M

Symbol	Inception	ETF Description	Net Assets
JKF	6/28/04	ISHARES MORNINGSTAR LARGE-CAP VALUE ETF	277.52M
JKG	6/28/04	ISHARES MORNINGSTAR MID-CAP ETF	270.35M
JKH	6/28/04	ISHARES MORNINGSTAR MID-CAP GROWTH ETF	202.99M
JKI	6/28/04	ISHARES MORNINGSTAR MID-CAP VALUE ETF	176.96M
JKJ	6/28/04	ISHARES MORNINGSTAR SMALL-CAP ETF	219.23M
JKK	6/28/04	ISHARES MORNINGSTAR SMALL-CAP GROWTH ETF	137.33M
JKL	6/28/04	ISHARES MORNINGSTAR SMALL-CAP VALUE ETF	358.03M
VDE	9/23/04	VANGUARD ENERGY ETF	3.19B
VIS	9/23/04	VANGUARD INDUSTRIAL ETF	1.76B
VNQ	9/23/04	VANGUARD REIT ETF	39.18B
VOX	9/23/04	VANGUARD TELECOMMUNICATIONS SERVICES ETF	636.14M
FXI	10/5/04	ISHARES CHINA LARGE-CAP ETF	5.09B
GLD	11/18/04	SPDR GOLD TRUST	33.75B
PEY	12/9/04	POWERSHARES HIGH YIELD EQUITY DIVIDEND ACHIEVERS	377.98M
PGJ	12/9/04	POWERSHARES GOLDEN DRAGON CHINA PORTFOLIO	307.28M
IAU	1/21/05	ISHARES GOLD TRUST	6.86B
KLD	1/24/05	ISHARES MSCI USA ESG SELECT ETF	253.73M
PBW	3/3/05	POWERSHARES WILDERHILL CLEAN ENERGY	238.23M
PWB	3/3/05	POWERSHARES DYNAMIC LARGE CAP GROWTH	298.03M
PXMV	3/3/05	FUNDAMENTAL PURE MID VALUE PORTFOLIO	42.29M
PXSG	3/3/05	FUNDAMENTAL PURE SMALL GROWTH PORTFOLIO	30.58M
PWV	3/3/05	POWERSHARES DYNAMIC LARGE CAP VALUE	774.71M
PXSV	3/3/05	FUNDAMENTAL PURE SMALL VALUE PORTFOLIO	66.97M
VGK	3/4/05	VANGUARD FTSE EUROPE ETF	21.98B
VPL	3/4/05	VANGUARD FTSE PACIFIC ETF	5.27B
VWO	3/4/05	VANGUARD FTSE EMERGING MARKETS ETF	58.35B
XLG	5/4/05	GUGGENHEIM RUSSELL TOP 50 MEGA CAP ETF	499.36M
PXQ	6/23/05	POWERSHARES DYNAMIC NETWORKING	31.44M
PBJ	6/23/05	POWERSHARES DYNAMIC FOOD AND BEVERAGE	434.12M
PBE	6/23/05	POWERSHARES DYNAMIC BIOTECHNOLOGY AND GENOME	408.44M
PEJ	6/23/05	POWERSHARES DYNAMIC LEISURE AND ENTERTAINMENT	201.90M
PBS	6/23/05	POWERSHARES DYNAMIC MEDIA	295.64M
PSI	6/23/05	POWERSHARES DYNAMIC SEMICONDUCTOR	16.57M
PSJ	6/23/05	POWERSHARES DYNAMIC SOFTWARE	60.76M
PJP	6/23/05	POWERSHARES DYNAMIC PHARMACEUTICAL	1.15B
EFG	8/1/05	ISHARES MSCI EAFE GROWTH ETF	1.79B
EFV	8/1/05	ISHARES MSCI EAFE VALUE ETF	2.48B
IWC	8/12/05	ISHARES MICROCAP ETF	1.05B
PZI	8/18/05	POWERSHARES ZACKS MICROCAP	65.47M
PID	9/15/05	POWERSHARES INTERNATIONAL DIVIDEND ACHIEVERS	1.12B
PFM	9/15/05	POWERSHARES DIVIDEND ACHIEVERS	344.44M
FDM	9/27/05	FIRST TRUST DOW JONES SELECT MICRO	90.76M
PMR	10/26/05	POWERSHARES DYNAMIC RETAIL	24.86M

Symbol	Inception	ETF Description	Net Assets
PXN	10/26/05	POWERSHARES LUX NANOTECH	-----
PUI	10/26/05	POWERSHARES DYNAMIC UTILITIES	40.17M
PXJ	10/26/05	POWERSHARES DYNAMIC OIL & GAS SERVICES	129.68M
PXE	10/26/05	POWERSHARES DYNAMIC ENERGY EXPLORATION & PRODUCTION	110.94M
PKB	10/26/05	POWERSHARES DYNAMIC BUILDING & CONSTRUCTION	123.64M
PPA	10/26/05	POWERSHARES AEROSPACE & DEFENSE	98.77M
RSCO	11/8/05	SPDR SMALL CAP COMPLETENESS ETF	84.17M
ONEK	11/8/05	SPDR RUSSELL 1000 ETF	53.04M
MDYG	11/8/05	SPDR S&P 400 MID CAP GROWTH ETF	165.04M
KIE	11/8/05	SPDR S&P INSURANCE ETF	301.78M
MDYV	11/8/05	SPDR S&P 400 MID CAP VALUE ETF	77.81M
KBE	11/8/05	SPDR S&P BANK ETF	2.71B
SDY	11/8/05	SPDR S&P DIVIDEND ETF	12.44B
SLY	11/8/05	SPDR S&P 600 SMALL CAP ETF	450.70M
KCE	11/8/05	SPDR S&P CAPITAL MARKETS ETF	206.08M
PHO	12/6/05	POWERSHARES WATER RESOURCES	1.01B
SPHQ	12/6/05	POWERSHARES S&P 500 HIGH QUALITY PORTFOLIO	351.79M
FXE	12/9/05	CURRENCYSHARES EURO TRUST	204.18M
PRF	12/19/05	POWERSHARES FTSE RAFI US 1000	3.17B
XHB	1/31/06	SPDR S&P HOMEBUILDERS ETF	2.01B
XSD	1/31/06	SPDR S&P SEMICONDUCTOR ETF	134.17M
XBI	1/31/06	SPDR S&P BIOTECH ETF	1.27B
DBC	2/3/06	POWERSHARES DB COMMODITY INDEX TRACKING FUND	5.65B
RPV	3/1/06	GUGGENHEIM S&P 500 PURE VALUE	639.55M
RPG	3/1/06	GUGGENHEIM S&P 500 PURE GROWTH	1.31B
RFV	3/1/06	GUGGENHEIM S&P 400 MIDCAP PURE VALUE	95.00M
RFG	3/1/06	GUGGENHEIM S&P 400 MIDCAP PURE GROWTH	838.52M
RZV	3/1/06	GUGGENHEIM S&P 600 SMALLCAP PURE VALUE	182.68M
RZG	3/1/06	GUGGENHEIM S&P 600 SMALLCAP PURE GROWTH	114.15M
FDL	3/9/06	FIRST TRUST MORNINGSTAR DIVIDEND LEADERS	677.18M
USO	4/10/06	UNITED STATES OIL FUND	571.09M
FPX	4/12/06	FIRST TRUST IPOX-100	509.72M
QQEW	4/19/06	FIRST TRUST NASDAQ 100 EQUAL WEIGHT	409.46M
QTEC	4/19/06	FIRST TRUST NASDAQ 100 TECHNOLOGY	218.68M
VIG	4/21/06	VANGUARD DIVIDEND APPRECIATION ETF	22.90B
SLV	4/21/06	ISHARES SILVER TRUST	6.55B
IHI	5/1/06	ISHARES U.S. MEDICAL DEVICES ETF	671.57M
IAK	5/1/06	ISHARES U.S. INSURANCE ETF	156.24M
IAI	5/1/06	ISHARES US BROKER-DEALERS ETF	254.74M
IEZ	5/1/06	ISHARES U.S. OIL EQUIPMENT & SERVICES ETF	536.34M
IAT	5/1/06	ISHARES U.S. REGIONAL BANKS ETF	473.79M
IHF	5/1/06	ISHARES U.S. HEALTHCARE PROVIDERS ETF	415.24M
ITA	5/1/06	ISHARES U.S. AEROSPACE & DEFENSE ETF	403.68M
ITB	5/1/06	ISHARES U.S. HOME CONSTRUCTION ETF	1.63B
IEO	5/1/06	ISHARES U.S. OIL & GAS EXPLORATION &	442.07M

Symbol	Inception	ETF Description	Net Assets
		PRODUCTION ETF	
IHE	5/1/06	ISHARES U.S. PHARMACEUTICALS ETF	665.48M
GDX	5/16/06	MARKET VECTORS TRUST GOLD MINERS	7.57B
RYJ	5/19/06	GUGGENHEIM RAYMOND JAMES SB-1 EQUITY ETF	294.48M
GSP	6/6/06	IPATH S&P GSCI TOTAL RETURN INDEX ETN	108.74M
DJP	6/6/06	IPATH DOW JONES-UBS COMMODITY ETN	1.63B
DES	6/16/06	WISDOMTREE SMALLCAP DIVIDEND	1.06B
DOO	6/16/06	WISDOMTREE INTERNATIONAL DIVIDEND EX-FINANCIALS FUND	349.55M
DFE	6/16/06	WISDOMTREE EUROPE SMALLCAP DIVIDEND	1.45B
DNL	6/16/06	WISDOMTREE GLOBAL EX-U.S. GROWTH FUND	62.01M
DLS	6/16/06	WISDOMTREE INTERNATIONAL SMALLCAP DIVIDEND	924.01M
AXJL	6/16/06	WISDOMTREE ASIA-PACIFIC EX-JAPAN FUND	52.58M
DLN	6/16/06	WISDOMTREE LARGECAP DIVIDEND	1.82B
DOL	6/16/06	WISDOMTREE INTERNATIONAL LARGECAP DIVIDEND	315.28M
AUSE	6/16/06	WISDOMTREE AUSTRALIA DIVIDEND FUND	55.14M
DTN	6/16/06	WISDOMTREE DIVIDEND EX-FINANCIALS FUND	1.13B
DFJ	6/16/06	WISDOMTREE JAPAN SMALLCAP DIVIDEND	284.11M
DXJ	6/16/06	WISDOMTREE JAPAN HEDGED EQUITY FUND	11.44B
DEW	6/16/06	WISDOMTREE GLOBAL EQUITY INCOME FUND	123.53M
DTD	6/16/06	WISDOMTREE TOTAL DIVIDEND	419.95M
DHS	6/16/06	WISDOMTREE EQUITY INCOME FUND	797.59M
DON	6/16/06	WISDOMTREE MIDCAP DIVIDEND	993.15M
DIM	6/16/06	WISDOMTREE INTERNATIONAL MIDCAP DIVIDEND	141.08M
DTH	6/16/06	WISDOMTREE DEFA EQUITY INCOME FUND	304.75M
MVV	6/19/06	PROSHARES ULTRA MIDCAP 400	159.50M
DOG	6/19/06	PROSHARES SHORT DOW 30	282.95M
PSQ	6/19/06	PROSHARES SHORT QQQ	209.84M
MYY	6/19/06	PROSHARES SHORT MIDCAP 400	28.05M
SH	6/19/06	PROSHARES SHORT S&P 500	1.60B
DDM	6/19/06	PROSHARES ULTRA DOW30	281.68M
QLD	6/19/06	PROSHARES ULTRA QQQ	768.63M
SSO	6/19/06	PROSHARES ULTRA S&P 500	3.22B
XES	6/19/06	SPDR S&P OIL & GAS EQUIPMENT & SERVICES ETF	293.59M
XPH	6/19/06	SPDR S&P PHARMACEUTICALS ETF	871.00M
XME	6/19/06	SPDR S&P METALS & MINING ETF	675.86M
XRT	6/19/06	SPDR S&P RETAIL ETF	720.55M
KRE	6/19/06	SPDR S&P REGIONAL BANKING ETF	2.65B
XOP	6/19/06	SPDR S&P OIL & GAS EXPLORATION & PRODUCTION ETF	1.06B
FBT	6/19/06	FIRST TRUST AMEX BIOTECHNOLOGY INDEX	1.17B
FDN	6/19/06	FIRST TRUST DOW JONES INTERNET INDEX	2.19B
FXA	6/21/06	CURRENCYSHARES AUSTRALIAN DOLLAR	315.62M
FXB	6/21/06	CURRENCYSHARES BRITISH POUND STERLING TRUST	82.09M
FXC	6/21/06	CURRENCYSHARES CANADIAN DOLLAR TRUST ETF	270.32M

Symbol	Inception	ETF Description	Net Assets
FXF	6/21/06	CURRENCYSHARES SWISS FRANC	260.38M
FXS	6/21/06	CURRENCYSHARES SWEDISH KRONA	53.71M
FTCS	7/6/06	FIRST TRUST CAPITAL STRENGTH ETF	-----
GSG	7/10/06	ISHARES GSCI COMMODITY INDEXED TRUST	1.08B
DXD	7/11/06	PROSHARES ULTRASHORT DOW 30	222.45M
MZZ	7/11/06	PROSHARES ULTRASHORT MIDCAP 400	11.36M
QID	7/11/06	PROSHARES ULTRASHORT QQQ	374.26M
SDS	7/11/06	PROSHARES ULTRASHORT S&P 500	1.58B
OIL	8/15/06	IPATH S&P GSCI CRUDE OIL INDEX ETN	223.27M
VOT	8/17/06	VANGUARD MID-CAP GROWTH ETF	4.41B
VOE	8/17/06	VANGUARD MID-CAP VALUE ETF	5.08B
JXI	9/12/06	ISHARES GLOBAL UTILITIES ETF	285.21M
MXI	9/12/06	ISHARES GLOBAL MATERIALS ETF	371.39M
EXI	9/12/06	ISHARES S&P GLOBAL INDUSTRIALS ETF	348.67M
KXI	9/12/06	ISHARES GLOBAL CONSUMER STAPLES ETF	579.26M
RXI	9/12/06	ISHARES GLOBAL CONSUMER DISCRETIONARY ETF	275.10M
DBV	9/18/06	POWERSHARES DB G10 CURRENCY HARVEST FUND	177.73M
PRFZ	9/20/06	POWERSHARES FTSE RAFI 1500 SM-MID	-----
EEB	9/21/06	GUGGENHEIM BRIC ETF	178.40M
NFO	9/21/06	GUGGENHEIM INSIDER SENTIMENT ETF	211.82M
CVY	9/21/06	GUGGENHEIM MULTI-ASSET INCOME ETF	1.23B
WMCR	9/21/06	WILSHIRE MICRO-CAP ETF	62.10M
EVX	10/10/06	MARKET VECTORS ENVIRONMENTAL SERVICES	19.74M
SLX	10/10/06	MARKET VECTORS TRUST STEEL	100.00M
PEZ	10/12/06	POWERSHARES DYNAMIC CONSUMER DISCRETIONARY SECTOR	38.79M
PYZ	10/12/06	POWERSHARES DYNAMIC BASIC MATERIALS	92.38M
PSL	10/12/06	POWERSHARES DYNAMIC CONSUMER STAPLES SECTOR	42.51M
PXI	10/12/06	POWERSHARES DYNAMIC ENERGY	196.44M
PFI	10/12/06	POWERSHARES DYNAMIC FINANCIAL SECTOR	33.11M
PTH	10/12/06	POWERSHARES DYNAMIC HEALTHCARE SECTOR	122.24M
PRN	10/12/06	POWERSHARES DYNAMIC INDUSTRIALS SECTOR	169.37M
PTF	10/12/06	POWERSHARES DYNAMIC TECHNOLOGY SECTOR	51.91M
PIQ	10/12/06	POWERSHARES DYNAMIC MAGNIQUANT	-----
GNAT	10/13/06	WISDOMTREE GLOBAL NATURAL RESOURCES FUND	22.38M
DBU	10/13/06	WISDOMTREE GLOBAL EX-US UTILITY FUND	30.25M
CCXE	10/13/06	WISDOMTREE COMMODITY COUNTRY EQUITY FUND	21.52M
PUW	10/24/06	POWERSHARES WILDERHILL PROGRESSIVE ENERGY	44.41M
PZD	10/24/06	POWERSHARES DYNAMIC CLEANTECH	86.48M
PSP	10/24/06	POWERSHARES LISTED PRIVATE EQUITY	576.42M
RYH	11/1/06	GUGGENHEIM S&P EQUAL WEIGHT HEALTHCARE	181.86M
RYU	11/1/06	GUGGENHEIM S&P EQUAL WEIGHT UTILITIES	61.82M
RYE	11/1/06	GUGGENHEIM S&P EQUAL WEIGHT ENERGY	131.65M
RGI	11/1/06	GUGGENHEIM S&P EQUAL WEIGHT INDUSTRIAL	91.09M

Symbol	Inception	ETF Description	Net Assets
RYT	11/1/06	GUGGENHEIM S&P EQUAL WEIGHT TECHNOLOGY	577.25M
RTM	11/1/06	GUGGENHEIM S&P EQUAL WEIGHT MATERIALS	81.36M
RYF	11/1/06	GUGGENHEIM S&P EQUAL WEIGHT FINANCIAL	99.19M
RHS	11/1/06	GUGGENHEIM S&P EQUAL WEIGHT CONSUMER STAPLES	111.68M
RCD	11/1/06	GUGGENHEIM S&P EQUAL WEIGHT CONSUMER DISCRETIONARY	102.30M
JSC	11/9/06	SPDR RUSSELL/NOMURA SMALL CAP JAPAN ETF	73.40M
JPP	11/9/06	SPDR RUSSELL/NOMURA PRIME JAPAN ETF	130.87M
VYM	11/10/06	VANGUARD HIGH DIVIDEND YIELD ETF	10.94B
DSI	11/14/06	ISHARES MSCI KLD 400 SOCIAL ETF	340.49M
FVI	12/5/06	FIRST TRUST VALUE LINE EQUITY ALL	5.23M
CSD	12/15/06	GUGGENHEIM CLEAR SPIN-OFF ETF	771.59M
DEF	12/15/06	GUGGENHEIM DEFENSIVE EQUITY ETF	128.25M
PKW	12/20/06	POWERSHARES BUYBACK ACHIEVERS	2.94B

Table A2. ETF Basic Statistics, Full Sample

Variable	Mean	Std. Deviation	Skewness	Kurtosis	Average Volume[1]
S&P 500	.007	0.64	-0.30	8.55	-----
10 Year Treasury	3.087	0.95	0.14	-0.89	-----
Fed Fund Futures	-----	-----	-----	-----	0.467
SPY	.007	0.64	-0.06	11.26	2000
MDY	0.013	0.74	-0.42	7.89	42.083
EWA	0.001	0.98	-0.05	6.93	31.565
EWC	0.003	0.77	-0.50	5.63	21.240
EWD	0.003	1.07	-0.27	4.72	2.656
EWG	0.004	0.89	0.05	7.73	26.307
EWH	0.006	0.86	0.18	8.69	52.486
EWI	-0.019	0.99	-0.19	3.61	5.494
EWJ	-0.004	0.68	0.20	10.39	262.626
EWK	-0.011	0.83	-0.57	5.60	1.384
EWL	0.007	0.68	-0.41	6.35	2.607
EWM	0.014	0.67	-0.30	5.93	21.958
EWN	0.000	0.85	-0.38	5.92	1.274
EWO	-0.015	0.98	-0.52	6.28	1.745
EWP	-0.008	0.99	-0.13	3.90	3.734
EWQ	-0.005	0.90	-0.15	4.74	4.216
EWS	0.004	0.85	0.15	7.34	29.807
EWU	-0.003	0.80	-0.23	9.68	13.982
EWW	0.007	0.89	0.22	8.75	31.875
DIA	0.007	0.59	0.36	13.44	122.117
XLB	0.007	0.80	-0.28	5.71	100.594
XLE	0.010	0.91	-0.53	10.13	208.321
XLF	-0.013	1.14	-0.05	9.09	954.337
XLI	0.010	0.69	-0.23	4.92	121.254
XLK	0.011	0.64	0.08	8.46	83.369
XLP	0.012	0.41	-0.34	5.43	60.920
XLU	0.001	0.55	0.43	11.52	73.798
XLV	0.012	0.50	-0.25	12.71	61.344
XLY	0.014	0.70	-0.35	5.77	63.385
QQQ	0.018	0.65	-0.07	6.67	953.821
EWY	0.007	1.08	0.48	11.19	30.117
IVV	0.007	0.63	-0.27	7.89	39.830
IWB	0.007	0.63	-0.30	7.70	17.541
IYW	0.012	0.65	-0.10	4.99	2.726
IJH	0.013	0.71	-0.38	6.00	9.961
IJR	0.012	0.76	-0.40	4.33	15.543
IVE	0.003	0.67	-0.33	6.53	7.429
IVW	0.010	0.59	-0.29	8.11	9.654
IWD	0.003	0.68	-0.18	7.70	21.696
IWF	0.011	0.60	-0.20	8.38	29.999
IWM	0.010	0.79	-0.36	4.44	644.104
IWV	0.007	0.64	-0.37	7.11	5.384
IYF	-0.009	1.02	-0.10	8.39	23.870
IYZ	0.000	0.69	-0.11	8.44	4.666

Variable	Mean	Std. Deviation	Skewness	Kurtosis	Average Volume[1]
IDU	0.002	0.54	-0.01	9.39	1.085
IYC	0.014	0.61	-0.16	5.73	0.783
IYE	-0.017	1.45	-20.52	675.11	6.062
IYG	-0.012	1.14	0.00	8.79	4.848
IYH	0.014	0.49	-0.28	8.34	1.047
IYJ	0.011	0.69	-0.44	4.65	1.140
IYK	0.012	0.49	-0.18	8.10	0.497
IYM	0.008	0.91	-0.64	5.60	8.211
IYR	-0.007	1.10	-0.37	10.38	134.652
IYY	0.008	0.63	-0.39	7.18	0.684
EWT	0.000	0.87	0.18	6.16	101.536
EWZ	-0.001	1.15	-0.32	9.99	157.848
IJJ	0.009	0.74	-0.38	6.48	1.863
IJK	0.016	0.70	-0.53	5.34	2.587
IJS	0.010	0.81	-0.34	4.46	2.085
IJT	-0.002	1.03	-15.60	466.07	2.479
IWN	0.005	0.83	-0.37	5.01	19.409
IWO	0.013	0.77	-0.26	4.15	21.564
IWW	0.003	0.69	-0.41	7.06	0.606
IWZ	0.011	0.60	-0.38	6.70	0.726
EZU	-0.023	1.17	-10.71	284.89	9.164
IEV	-0.020	1.10	-12.79	358.95	5.328
DGT	-0.002	0.63	-0.60	5.19	0.123
SLYG	0.016	0.73	-0.30	5.33	0.147
SLYV	0.010	0.77	-0.26	4.55	0.137
SPYG	0.012	0.60	-0.37	8.45	0.231
SPYV	0.003	0.65	-0.48	8.23	0.135
MTK	0.011	0.71	-0.14	7.04	0.211
THRK	0.008	0.66	1.18	28.15	0.154
OEF	0.005	0.61	-0.22	9.62	12.848
IOO	0.001	0.67	-0.22	8.11	1.355
ICF	-0.007	1.21	-0.32	10.22	9.477
IBB	0.026	0.63	-0.28	3.48	8.863
IGM	0.014	0.65	-0.13	5.35	0.842
RWR	-0.005	1.18	-0.24	10.34	4.330
VTI	-0.009	0.97	-17.73	556.93	24.330
IGN	0.000	0.80	-0.16	2.67	0.995
IGV	0.015	0.69	-0.13	4.88	1.289
IWP	-0.005	1.02	-16.68	509.68	7.702
IWR	0.010	0.69	-0.35	6.03	7.491
IWS	-0.020	1.38	-26.37	944.64	13.018
EFA	-0.002	0.77	-0.04	8.69	186.759
IGE	-0.021	1.47	-20.13	656.64	3.925
ITF	-0.021	0.98	-16.55	513.19	0.273
EPP	-0.024	1.46	-20.72	687.65	10.404
ILF	-0.038	2.01	-25.56	908.54	17.955
IXC	-0.023	1.43	-21.87	736.19	2.012
IXG	-0.012	0.97	-0.23	6.61	0.653
IXN	0.009	0.66	-0.25	5.14	0.625

Variable	Mean	Std. Deviation	Skewness	Kurtosis	Average Volume[1]
IXP	0.002	0.63	0.23	9.27	0.615
IXJ	0.010	0.53	-0.31	11.52	0.748
VXF	-0.005	1.03	-14.63	425.58	1.602
IEF	0.005	0.21	0.07	1.95	7.124
LQD	0.002	0.27	-1.05	70.98	11.728
SHY	0.001	0.05	-0.51	6.36	11.163
TLT	0.003	0.44	0.03	1.44	58.907
FEU	-0.005	0.79	-0.22	5.97	0.253
FEZ	-0.006	0.93	-0.01	5.64	3.317
ADRA	-0.003	0.80	0.02	8.01	0.149
ADRD	-0.004	0.78	-0.31	9.63	0.210
ADRE	-0.001	0.96	0.11	12.39	1.874
ADRU	-0.005	0.78	-0.42	6.61	0.080
EZA	-0.014	1.33	-7.49	175.82	3.483
EEM	-0.025	1.56	-17.78	565.20	625.297
RSP	0.010	0.71	-0.22	6.55	8.675
PWC	0.007	0.64	-0.53	10.39	0.281
PWO	0.007	0.62	-0.33	4.23	0.062
FVL	0.006	0.70	-0.77	5.27	0.360
FVD	0.006	0.56	-0.59	8.41	0.884
AGG	0.002	0.17	-3.05	76.32	7.999
ONEQ	0.013	0.64	-0.19	4.84	0.600
IYT	0.012	0.78	-0.31	3.18	8.070
DVY	0.000	0.66	-0.51	8.61	8.992
TIP	0.003	0.20	0.03	6.21	8.330
ITOT	-0.010	0.97	-18.58	591.43	0.577
VAW	0.009	0.83	-0.62	5.26	1.404
VB	0.012	0.77	-0.44	5.05	3.648
VBK	0.015	0.76	-0.47	4.94	1.698
VBR	0.008	0.79	-0.44	5.67	1.678
VCR	0.014	0.70	-0.24	5.00	0.816
VDC	0.013	0.43	-0.22	8.08	0.755
VFH	-0.010	1.02	-0.10	8.61	2.574
VGT	0.013	0.65	-0.14	5.10	1.700
VHT	0.014	0.51	-0.17	9.57	0.848
VO	0.010	0.72	-0.48	6.52	2.496
VPU	0.002	0.55	0.30	11.27	1.052
VTV	0.003	0.67	-0.35	7.21	4.859
VUG	0.012	0.61	-0.25	8.77	5.142
VV	0.007	0.63	-0.24	8.08	2.954
NY	0.003	0.60	-0.42	7.57	0.124
NYC	0.003	0.65	-0.33	7.34	0.124
JKD	0.009	0.57	-0.20	7.50	0.234
JKE	0.011	0.61	-0.24	8.26	0.430
JKF	-0.001	0.67	-0.50	7.84	0.312
JKG	0.011	0.70	-0.55	6.19	0.140
JKH	0.013	0.71	-0.58	6.62	0.260
JKI	0.007	0.70	-0.49	5.95	0.144
JKJ	0.010	0.77	-0.29	4.08	0.196

Variable	Mean	Std. Deviation	Skewness	Kurtosis	Average Volume[1]
JKK	0.014	0.73	-0.53	4.81	0.145
JKL	0.009	0.81	-0.39	4.57	0.228
VDE	0.010	0.90	-0.57	10.13	1.476
VIS	0.010	0.72	-0.40	4.59	0.766
VNQ	-0.004	1.14	-0.20	9.08	22.451
VOX	0.003	0.65	-0.04	8.17	0.554
FXI	-0.026	1.66	-14.97	449.87	208.359
GLD	0.015	0.59	-0.30	5.74	128.928
PEY	-0.008	0.83	-0.18	9.60	1.656
PGJ	0.009	1.01	-0.18	4.91	2.531
IAU	-0.042	2.45	-38.41	1565.10	48.730
KLD	0.006	0.59	-0.40	6.68	0.100
PBW	-0.025	1.08	-0.37	4.61	5.034
PWB	0.011	0.64	-0.62	10.61	1.197
PXMV	0.007	0.68	-0.74	7.77	0.180
PXSG	0.007	0.71	-0.41	3.69	0.249
PWV	0.009	0.64	-0.50	12.15	1.309
PXSV	0.008	0.78	-0.55	5.19	0.282
VGK	-0.004	0.84	-0.28	5.68	12.897
VPL	-0.002	0.69	0.09	9.26	2.310
VWO	-0.016	1.21	-8.37	211.77	127.233
XLG	0.005	0.59	-0.22	8.84	0.852
PXQ	0.015	0.79	-0.15	2.92	0.326
PBJ	0.012	0.49	-0.42	4.19	0.754
PBE	0.018	0.70	-0.24	4.38	0.587
PEJ	0.016	0.73	-0.04	5.05	0.442
PBS	0.012	0.73	-0.39	5.55	0.739
PSI	0.002	0.83	-0.21	1.87	0.439
PSJ	0.016	0.65	-0.31	3.46	0.195
PJP	0.027	0.54	-0.49	6.73	0.756
EFG	0.001	0.74	-0.19	10.37	1.347
EFV	-0.006	0.80	-0.23	7.87	1.858
IWC	0.006	0.78	-0.38	4.58	1.452
PZI	-0.001	0.80	-0.41	4.47	0.427
PID	-0.001	0.74	-0.83	11.40	2.003
PFM	0.004	0.57	-0.69	11.00	0.861
FDM	0.008	0.82	-0.30	5.16	0.249
PMR	0.014	0.69	0.07	2.50	0.367
PXN	-0.021	0.80	-0.41	4.43	0.280
PUI	0.002	0.53	-0.05	10.36	0.256
PXJ	0.006	1.11	-0.73	7.30	1.172
PXE	0.015	1.03	-0.66	9.00	0.436
PKB	0.008	0.87	-0.35	4.20	0.369
PPA	0.013	0.64	-0.50	4.63	0.802
RSCO	0.009	0.71	-0.39	5.95	0.089
ONEK	0.007	0.58	-0.77	7.83	0.049
MDYG	0.015	0.71	-0.57	6.29	0.080
KIE	0.003	1.00	-0.11	8.85	3.652
MDYV	0.007	0.67	-0.01	6.76	0.048

Variable	Mean	Std. Deviation	Skewness	Kurtosis	Average Volume[1]
KBE	-0.014	1.24	-0.02	9.58	41.888
SDY	0.004	0.66	-0.15	9.08	5.558
SLY	0.013	0.87	2.17	69.45	0.117
KCE	-0.007	1.06	-0.29	7.85	2.673
PHO	0.009	0.82	-0.29	6.22	3.526
SPHQ	0.006	0.62	-0.46	8.62	0.657
FXE	0.001	0.29	0.01	2.06	8.530
PRF	0.009	0.68	-0.29	6.81	1.154
XHB	-0.003	1.11	0.05	2.49	61.419
XSD	0.005	0.87	-0.34	2.08	0.929
XBI	0.026	0.74	-0.12	4.07	2.133
DBC	0.001	0.61	-0.36	2.35	17.512
RPV	0.010	0.86	-0.50	5.79	0.378
RPG	0.017	0.67	-0.17	6.32	0.441
RFV	0.009	0.84	-0.56	6.18	0.137
RFG	0.021	0.72	-0.60	7.41	0.483
RZV	0.010	0.99	-0.36	4.90	0.350
RZG	0.017	0.70	-0.31	3.50	0.107
FDL	-0.002	0.68	-0.17	10.71	1.113
USO	-0.009	0.96	-0.26	2.66	102.727
FPX	0.018	0.66	-0.29	9.16	0.156
QQEW	0.015	0.67	-0.28	5.45	0.449
QTEC	0.014	0.73	-0.15	4.66	0.794
VIG	0.008	0.55	-0.11	7.63	5.991
SLV	0.012	0.50	-0.25	12.71	61.344
IHI	0.015	0.60	-0.40	6.31	0.749
IAK	-0.003	0.94	-0.09	8.87	0.250
IAI	-0.008	1.03	-0.13	7.14	4.845
IEZ	0.009	1.10	-0.74	7.46	1.915
IAT	-0.011	1.08	-0.09	7.86	1.282
IHF	0.013	0.67	-0.60	9.85	0.889
ITA	0.017	0.68	-0.29	4.72	0.460
ITB	-0.013	1.23	0.07	2.81	15.447
IEO	0.013	1.07	-0.59	9.75	2.854
IHE	0.020	0.53	-0.42	7.15	0.369
GDX	-0.016	1.24	0.17	6.21	118.748
RYJ	0.015	0.76	-0.41	8.71	0.324
GSP	-0.005	0.72	-0.44	2.70	0.422
DJP	-0.007	0.55	-0.47	2.44	3.810
DES	0.004	0.83	-0.39	6.75	0.434
DOO	-0.007	0.83	-0.44	7.49	0.453
DFE	-0.003	0.75	-0.94	5.36	0.214
DNL	-0.003	0.69	-0.07	5.73	0.103
DLS	0.000	0.67	-0.36	4.73	0.496
AXJL	0.001	0.86	-0.21	6.22	0.179
DLN	0.003	0.62	-0.33	7.87	0.990
DOL	-0.004	0.76	-0.16	7.57	0.231
AUSE	-0.001	0.93	-0.43	6.69	0.167
DTN	0.004	0.65	-0.25	8.50	0.842

Variable	Mean	Std. Deviation	Skewness	Kurtosis	Average Volume[1]
DFJ	0.000	0.62	-0.18	4.05	0.396
DXJ	-0.002	0.68	-0.24	6.35	8.916
DEW	-0.006	0.78	-0.42	7.14	0.103
DTD	0.004	0.62	-0.51	7.25	0.235
DHS	-0.001	0.72	-0.32	8.35	0.535
DON	0.007	0.72	-0.50	5.50	0.375
DIM	-0.002	0.75	-0.27	7.00	0.195
DTH	-0.007	0.80	-0.46	6.02	0.232
MVV	0.012	1.44	-0.56	6.64	7.012
DOG	-0.022	0.58	-0.66	11.05	4.829
PSQ	-0.030	0.65	-0.30	7.38	4.754
MYY	-0.030	0.72	-0.17	7.57	0.525
SH	-0.022	0.65	-0.55	11.94	25.511
DDM	0.008	1.13	-0.36	7.97	27.052
QLD	0.005	1.47	-5.06	102.45	165.905
SSO	0.004	1.24	-0.42	8.06	185.209
XES	0.010	1.11	-0.78	7.68	1.714
XPH	0.023	0.57	-0.38	5.85	0.421
XME	-0.004	1.28	-0.55	5.27	30.142
XRT	0.019	0.81	-0.23	4.60	77.770
KRE	-0.005	1.08	0.13	6.64	29.980
XOP	0.014	1.12	-0.60	8.76	32.540
FBT	0.027	0.73	0.17	5.70	0.823
FDN	0.024	0.75	-0.20	4.40	1.372
FXA	0.003	0.45	-0.44	7.56	1.926
FXB	-0.005	0.28	-0.75	6.05	0.587
FXC	0.002	0.30	-0.17	3.13	1.386
FXF	0.007	0.33	-0.77	12.95	1.029
FXS	0.001	0.41	0.02	3.64	0.066
FTCS	0.010	0.69	-0.42	11.80	0.148
GSG	-0.005	0.72	-0.44	3.03	3.290
DXD	-0.018	1.85	19.52	646.29	11.977
MZZ	-0.038	2.02	13.57	400.43	0.318
QID	-0.032	2.09	20.06	664.37	12.302
SDS	-0.017	1.91	17.71	564.90	78.226
OIL	-0.012	0.99	-0.35	2.81	7.575
VOT	0.012	0.73	-0.49	6.92	1.301
VOE	0.008	0.72	-0.36	6.48	1.398
JXI	-0.006	0.63	0.00	13.43	0.423
MXI	0.002	0.93	-0.34	6.32	0.896
EXI	0.006	0.72	-0.37	5.05	0.295
KXI	0.012	0.50	-0.09	10.05	0.473
RXI	0.009	0.68	-0.47	6.30	0.207
DBV	-0.001	0.42	-0.79	11.71	1.596
PRFZ	0.014	0.80	-0.34	4.20	0.504
EEB	0.002	1.07	-0.08	8.59	2.468
NFO	0.013	0.73	-0.28	6.15	0.340
CVY	-0.002	0.68	-0.42	11.12	1.422
WMCR	-0.001	0.77	-0.34	10.55	0.081

Variable	Mean	Std. Deviation	Skewness	Kurtosis	Average Volume[1]
EVX	0.009	0.68	-0.53	5.24	0.047
SLX	0.002	1.30	-0.44	6.92	2.047
PEZ	0.011	0.69	-0.24	3.68	0.115
PYZ	0.015	0.85	-0.38	5.05	0.152
PSL	0.013	0.50	-0.43	16.09	0.086
PXI	0.017	0.94	-0.87	9.21	0.248
PFI	0.003	0.77	-0.08	7.33	0.080
PTH	0.015	0.58	-0.78	7.61	0.190
PRN	0.014	0.77	-0.71	7.99	0.237
PTF	0.008	0.67	-0.42	3.43	0.100
PIQ	0.009	0.65	-0.47	6.71	0.101
GNAT	-0.007	0.92	-0.31	6.90	0.162
DBU	-0.011	0.75	0.08	10.12	0.184
CCXE	0.001	0.87	-0.40	5.31	0.169
PUW	0.005	0.90	-0.94	11.72	0.115
PZD	0.006	0.87	-0.67	8.05	0.237
PSP	-0.019	1.01	-0.35	7.73	1.767
RYH	0.019	0.52	-0.33	8.65	0.221
RYU	0.003	0.58	-0.26	16.28	0.058
RYE	0.012	1.01	-0.69	7.36	0.083
RGI	0.012	0.69	-0.29	6.41	0.064
RYT	0.011	0.68	-0.32	4.03	0.189
RTM	0.011	0.78	-0.52	4.78	0.069
RYF	-0.006	1.06	0.49	14.63	0.123
RHS	0.015	0.42	-0.65	4.43	0.055
RCD	0.013	0.79	-0.34	7.84	0.142
JSC	-0.001	0.65	-0.09	5.46	0.217
JPP	-0.004	0.65	0.37	11.39	0.074
VYM	0.005	0.60	-0.31	7.67	2.460
DSI	0.007	0.61	-0.30	8.73	0.108
FVI	0.006	0.59	-0.42	6.62	0.033
CSD	0.014	0.67	-0.58	7.83	0.303
DEF	0.008	0.47	-0.17	10.48	0.151
PKW	0.013	0.60	-0.41	7.60	0.779

[1]In 100,000 shares

This table displays the basic statistics of all 318 ETFs, Fed fund futures, 10 Year Treasury-yield, and market index.

Table A3. ETF Results, Full Sample

	Returns Equation $R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 10YRT_t + \varepsilon_t$				Variance Equation $h_{it} = \alpha_0 + \alpha_1 VOL_{it} + \alpha_2 FFV_t + \alpha_3 \varepsilon_{t-1}^2 + \alpha_4 h_{t-1}$				
Variable	**S&P 500**	**10 Yr. Treasury**	**Volume[1]**	**Fed Funds Futures Volume[1]**	**ARCH (1)**	**GARCH (1)**	**Wald Chi[2] Test**	**Volatility Test**	**Fed Action Test**
SPY	0.99***	0.00	0.00***	1.26***	6323.63	0.29***	308751.57***	45.98***	8.76**
MDY	1.10***	0.00	0.02***	0.18	0.13***	-0.01	15885.80***	77.88***	1.65
EWA	1.29***	0.02**	0.01	1.32***	0.17***	0.57***	6034.47***	13.41***	16.27***
EWC	1.03***	0.03***	0.01	1.61***	0.27***	0.59***	5845.96***	10.65***	20.73***
EWD	1.45***	0.01	0.01	1.21**	0.19***	0.65***	7307.83***	9.74***	10.57***
EWG	1.21***	0.01	0.01***	1.30***	0.18***	0.63***	7841.67***	19.07***	15.31***
EWH	1.01***	0.00	0.01***	0.45***	0.17***	-0.01	4502.17***	26.29***	6.00**
EWI	1.27***	0.00	0.06*	1.95*	0.25***	0.75***	5385.96***	7.32**	6.00**
EWJ	0.77***	0.00	0.00***	0.32***	0.08**	-0.01	3061.37***	48.20***	4.02
EWK	1.08***	-0.01	0.05*	1.18***	0.23***	0.52***	6118.83***	16.31***	15.12***
EWL	0.89***	0.00	0.03	0.82***	0.13***	0.31*	5895.58***	15.22***	14.45***
EWM	0.75***	0.01	0.02***	0.86***	0.27***	0.31***	3565.36***	32.44***	11.34***
EWN	1.18***	0.01	0.04	1.14***	0.23***	0.46***	8762.90***	17.70***	17.40***
EWO	1.21***	0.00	0.04	1.07***	0.20***	0.51***	4507.95***	11.28***	10.85***
EWP	1.22***	0.01	0.12***	0.37***	0.15***	-0.02	5734.96***	34.17***	5.36*
EWQ	1.25***	0.00	0.02	1.47**	0.17***	0.71***	8497.06***	13.20***	-----
EWS	1.03***	0.01	0.02***	0.52***	0.24***	0.28***	4297.39***	29.46***	8.18**
EWU	1.09***	0.01	0.01	1.49***	0.21***	0.50***	9216.91***	26.69***	25.94***
EWW	1.10***	0.01	0.05***	-0.14	0.15***	0.10*	5589.25***	77.89***	1.78
DIA	-0.02	0.01	0.01***	-0.22*	-0.03***	0.00	3.04	193.59***	2.49
XLB	1.16***	0.02***	0.01***	0.66***	0.26***	0.16**	8508.69***	43.46***	11.69***
XLE	1.16***	0.03***	0.01***	0.12	0.07***	-0.04	3905.63***	173.98***	7.97**
XLF	1.30***	-0.02***	0.00***	0.25	0.05***	0.00	7297.25***	241.56***	6.34**
XLI	1.08***	0.00	0.00**	1.41***	0.32***	0.43***	18168.03***	17.45***	17.00***
XLK	0.92***	0.01*	0.00*	1.29***	0.22***	0.46***	14976.32***	20.05***	20.43***
XLP	0.55***	0.00	0.01***	1.16***	0.31***	0.39***	5550.61***	27.97***	16.56***
XLU	0.60***	0.01	0.01***	0.80***	0.26***	0.16*	2703.55***	40.07***	14.10***
XLV	0.67***	-0.01*	0.01***	0.87***	0.35***	0.22*	6262.14***	18.40***	12.83***
XLY	1.03***	-0.01***	0.01***	1.13***	0.28***	0.35***	12740.41***	18.58***	18.48***

	Returns Equation $R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 10YRT_t + \varepsilon_t$		Variance Equation $h_{it} = \alpha_0 + \alpha_1 VOL_{it} + \alpha_2 FFV_t + \alpha_3 \varepsilon_{t-1}^2 + \alpha_4 h_{t-1}$						
Variable	**S&P 500**	**10 Yr. Treasury**	**Volume[1]**	**Fed Funds Futures Volume[1]**	**ARCH (1)**	**GARCH (1)**	**Wald Chi[2] Test**	**Volatility Test**	**Fed Action Test**
QQQ	0.96***	0.01	0.00***	-0.64***	0.05	-0.01	9947.57***	128.64***	12.89***
EWY	1.29***	0.02**	0.04***	0.27**	0.13***	-0.02	3603.33***	86.56***	5.08*
IVV	0.98***	0.00	0.02***	1.23***	0.87***	0.13**	352434.36***	27.54***	14.96***
EWB	0.99***	0.00	0.03***	1.20***	0.35***	0.12*	268796.96***	64.70***	20.48***
IYW	0.96***	0.01*	0.11***	0.43***	0.22***	0.01	12062.38***	12.13***	6.79**
IJH	1.09***	0.00	0.03***	0.71***	0.26***	0.00	26376.21***	20.86***	14.54***
IJR	1.16***	0.00	0.05***	0.29	0.19***	0.30***	13676.25***	29.48***	1.47
IVE	1.04***	0.00	0.09***	0.70***	0.18***	0.14	63959.45***	52.94***	11.18***
IVW	0.93***	0.00	0.08***	0.73***	0.14***	0.21***	53663.87***	78.07***	13.00***
IWD	1.04***	0.00	0.03***	0.76***	0.25***	0.14*	69828.90***	39.74***	11.57***
IWF	0.94***	0.00	0.03***	0.94***	0.25***	0.27***	40007.88***	48.34***	13.85***
IWM	1.20***	0.00	0.00***	-0.52***	0.18***	-0.01	13308.21***	73.90***	5.84*
IWV	1.01***	0.00	0.10***	0.96***	0.25***	0.18**	168504.11***	61.88***	14.11***
IYF	1.27***	-0.02***	0.03***	1.04***	0.10***	0.00	12836.82***	189.43***	37.57***
IYZ	0.91***	0.00	0.05**	0.76***	0.24***	0.26**	7355.73***	13.14***	9.30***
IDU	0.66***	0.00	0.06***	0.90*	0.24***	0.63***	4446.04***	6.15**	3.94
IYC	0.91***	-0.01***	0.40***	0.90***	0.17***	0.24**	15723.53***	34.00***	19.34***
IYE	1.15***	0.02***	0.11***	0.43***	0.00	0.01	6297.75***	192.80***	9.53***
IYG	1.40***	-0.02***	0.12***	1.01***	0.21***	-0.04*	10096.67***	121.99***	-----
IYH	0.70***	-0.01	0.14***	0.50***	0.32***	0.00	10109.39***	-4.16	-2.81
IYJ	1.08***	0.00	0.05	1.22***	0.23***	0.57***	28365.65***	9.55***	10.36***
IYK	0.71***	0.00	-----	1.30***	0.25***	0.62***	16977.87***	-----	-----
IYM	1.28***	0.03***	0.05***	0.73***	0.35***	0.18**	9123.52***	32.16***	18.53***
IYR	1.11***	-0.01	0.01***	0.78***	0.17***	-0.02	3785.38***	160.69***	16.98***
IYY	1.00***	0.00	0.68***	0.49***	0.27***	0.06	208322.32***	29.03***	4.27
EWT	1.00***	0.01	0.01***	0.29**	0.14***	-0.02	2857.17***	71.12***	2.93
EWZ	1.36***	0.06***	0.01***	0.98***	0.13***	0.05	3191.60***	72.96***	43.22***
IJJ	1.10***	0.00	0.12***	0.62***	0.28***	0.26**	28371.21***	15.69***	5.91*
IJK	1.07***	0.01	0.09***	0.87***	0.22***	0.35***	21636.68***	25.66***	12.75***
IJS	1.23***	-0.01	0.12***	0.62***	0.26***	0.00	16862.41***	-1.43	10.26***
IJT	1.10***	0.00	0.07***	0.52***	0.11***	-0.09***	16604.86***	41.82***	8.72**
IWN	1.23***	-0.01	0.06***	0.10	0.19***	0.21**	14156.84***	42.87***	0.75
IWO	1.18***	0.00	0.03***	0.25	0.19***	0.44***	13977.03***	17.32***	0.96

	Returns Equation $R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 10YRT_t + \varepsilon_t$		Variance Equation $h_{it} = \alpha_0 + \alpha_1 VOL_{it} + \alpha_2 FFV_t + \alpha_3 \varepsilon_{t-1}^2 + \alpha_4 h_{t-1}$						
Variable	**S&P 500**	**10 Yr. Treasury**	**Volume[1]**	**Fed Funds Futures Volume[1]**	**ARCH (1)**	**GARCH (1)**	**Wald Chi[2] Test**	**Volatility Test**	**Fed Action Test**
IWZ	0.94***	0.00	0.35***	0.75***	0.33***	0.00	55723.62***	26.24***	13.81***
EZU	1.26***	0.00	0.00	0.73***	0.00	-0.02	9125.26***	21.34***	20.65***
IEV	1.17***	0.00	0.04***	0.67***	0.00	0.01	10745.45***	37.56***	13.12***
DGT	0.92***	0.00	0.44	1.00***	0.42***	0.39***	9948.78***	9.38***	8.67**
SLYG	1.10***	0.00	0.88***	0.27	0.31***	0.32***	13597.92***	5.62*	1.05
SLYV	1.16***	-0.01	0.28	0.94***	0.27***	0.53***	13435.52***	8.44**	8.46**
SPYG	0.93***	0.00	0.91***	0.67***	0.36***	0.00	43789.18***	24.84***	10.62***
SPYV	0.98***	-0.01*	0.04	0.61**	0.60***	0.39***	34488.71***	2.89	4.43
MTK	1.03***	0.01	0.69***	0.53***	0.25***	-0.04	11654.80***	11.09***	4.50
THRK	0.97***	0.00	0.04	0.65***	0.32***	-0.02***	53225.18***	-1.02	-----
OEF	0.94***	0.00	0.05***	0.71***	0.27***	0.01	126300.29***	45.64***	9.91***
IOO	1.00***	0.00	0.17***	0.63***	0.11***	0.00	27548.84***	28.62***	12.14***
ICF	1.20***	-0.01	0.13***	0.05	0.12***	0.03	3376.94***	125.98***	0.58
IBB	0.78***	0.00	0.09***	-0.39***	0.10***	0.02	3556.95***	67.38***	4.92*
IGM	0.97***	0.01*	0.15**	0.84***	0.27***	0.45***	13962.45***	10.60***	8.91**
VTI	1.01***	0.00	0.01***	1.42***	0.00	0.01**	194827.22***	71.97***	48.16***
IGN	1.10***	0.02*	0.04	0.54*	0.15***	0.57**	7249.61***	3.92	4.66*
IGV	0.99***	0.00	0.17***	0.26*	0.11***	0.15	8604.09***	5.77*	2.06
IWP	1.07***	0.01*	0.06***	0.55***	0.13***	-0.12***	27542.24***	50.61***	9.82***
IWR	1.07***	0.00	0.04***	1.03***	0.18***	0.21**	44096.09***	51.16***	23.86***
IWS	1.09***	0.00	0.04***	0.53***	0.00	0.00	36147.46***	58.52***	8.46**
EFA	1.08***	0.01	0.01***	0.96***	0.04	0.06	8743.82***	100.85***	36.20***
IGE	1.20***	0.03***	0.18***	0.73***	0.00	0.00	6004.16***	107.95***	24.06***
ITF	0.77***	-0.01	0.21*	0.33**	0.12***	-0.06	3379.76***	6.63**	3.80
EPP	1.23***	0.02**	0.03***	0.81***	0.09***	-0.08**	8961.60***	39.62***	22.39***
ILF	1.32***	0.04***	0.04***	0.49***	0.08***	-0.06*	5455.25***	97.98***	17.52***
IXC	1.17***	0.03***	0.03	1.28***	0.00	0.03	9672.02***	43.00***	44.28***
IXG	1.37***	-0.01	0.20**	0.96***	0.37***	0.42***	16416.71***	10.58***	9.28***
IXN	0.97***	0.01*	0.11	0.97***	0.26***	0.43***	13134.95***	12.59***	11.47***
IXP	0.86***	0.01	0.00	1.00***	0.18***	0.34**	8212.67***	17.59***	18.44***
IXJ	0.72***	-0.01*	0.23***	1.09***	0.34***	0.42***	9948.65***	12.96***	11.17***
VXF	1.14***	0.00	0.18***	0.57***	0.05***	0.00	23970.26***	41.51***	8.71**
IEF	-0.18***	0.00	0.04***	0.69***	0.13***	0.03	884.62***	15.54***	12.36***

	Returns Equation $R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 10YRT_t + \varepsilon_t$		Variance Equation $h_{it} = \alpha_0 + \alpha_1 VOL_{it} + \alpha_2 FFV_t + \alpha_3 \varepsilon_{t-1}^2 + \alpha_4 h_{t-1}$						
Variable	**S&P 500**	**10 Yr. Treasury**	**Volume[1]**	**Fed Funds Futures Volume[1]**	**ARCH (1)**	**GARCH (1)**	**Wald Chi[2] Test**	**Volatility Test**	**Fed Action Test**
LQD	-0.04***	-0.01*	0.04***	1.55***	0.21***	0.03	32.91***	43.72***	43.88***
SHY	-0.02***	0.00***	0.00	2.73***	0.31***	-0.01	312.11***	61.95***	69.08***
TLT	-0.29***	-0.01	0.01***	0.20	0.08***	-0.14**	799.26***	80.64***	2.21
FEU	1.08***	0.00	0.02	1.08***	0.23***	0.53***	7750.57***	12.20***	11.96***
FEZ	1.29***	0.00	-0.06	1.08**	0.24***	0.67***	8629.39***	7.32**	5.06*
ADRA	1.04***	0.00	0.86***	0.31	0.18***	0.48***	5830.09***	8.54**	1.20
ADRD	1.07***	0.00	0.69***	0.40**	0.20***	0.12	9865.90***	15.08***	4.09
ADRE	1.23***	0.04***	0.25***	0.31**	0.14***	0.06	7208.42***	60.72***	11.16***
ADRU	1.04***	0.01	-0.05	0.76***	0.29***	0.46***	7230.97***	6.26**	6.25**
EZA	1.37***	0.03**	0.18***	0.48***	0.13***	-0.01	4553.15***	40.50***	8.48**
EEM	1.31***	0.03***	0.00***	0.64***	0.14***	-0.12***	6012.77***	111.14***	32.99***
RSP	1.09***	0.00	0.00	1.28***	0.46***	0.43***	73453.85***	8.79**	8.74**
PWC	0.95***	-0.01	0.78*	1.66**	0.22***	0.73***	26829.61***	6.27**	5.47*
PWO	0.86***	0.00	-57.22	2.47**	0.34***	0.65***	7350.88***	3.72	2.27
FVL	1.03***	0.01*	-0.11	0.83**	0.39***	0.46***	10027.14***	3.75	5.56*
FVD	0.83***	0.00	-1.38**	1.40***	0.32***	0.51***	26131.45***	23.55***	7.28**
AGG	-0.07***	0.00	0.04**	1.18***	0.30***	0.24**	317.73***	13.81***	14.17***
ONEQ	0.98***	0.00	0.09***	0.69***	0.28***	0.40***	23091.38***	11.67***	6.56**
ITY	1.08***	0.00	0.11***	0.19	0.06**	-0.05**	7708.60***	86.66***	1.30
DVY	0.90***	-0.01**	0.04***	1.55***	0.39***	0.34***	19585.52***	23.43***	23.61***
TIP	-0.10***	0.00	0.04***	1.00***	0.20***	0.08	267.98***	21.64***	19.66***
ITOT	1.00***	0.00	0.01	0.95***	0.09***	-0.09***	174696.01***	40.06***	39.47***
VAW	1.21***	0.02***	0.15***	0.77***	0.29***	0.00	12357.23***	20.31***	13.40***
VB	1.18***	0.00	0.03***	0.91***	0.29***	0.46***	22171.63***	10.51***	7.23**
VBK	1.16***	0.01	0.14***	0.78***	0.23***	0.40***	20000.72***	15.52***	9.13***
VBR	1.19***	-0.01	0.21***	0.97***	0.29***	0.34***	18925.74***	24.05***	17.38***
VCR	1.04***	-0.01**	0.35***	0.93***	0.14***	0.00	17087.70***	28.52***	29.34***
VDC	0.59***	0.00	0.59***	0.62***	0.14*	-0.02	7130.06***	27.49***	12.34***
VFH	1.27***	-0.02***	0.27***	1.41***	0.27***	0.00	12932.32***	68.77***	49.89***
VGT	0.97***	0.01	0.05	1.18***	0.23*	0.61	14761.17***	7.49**	-----
VHT	0.73***	-0.01	0.51***	0.89***	0.28***	0.34***	10040.18***	15.60***	10.84***
VO	1.10***	0.00	0.09***	0.83***	0.19***	0.00	40856.95***	18.34***	11.25***
VTV	1.03***	0.00	0.04***	1.21***	0.41***	0.35***	93653.57***	15.98***	14.98***

	Returns Equation $R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 10YRT_t + \varepsilon_t$		Variance Equation $h_{it} = \alpha_0 + \alpha_1 VOL_{it} + \alpha_2 FFV_t + \alpha_3 \varepsilon_{t-1}^2 + \alpha_4 h_{t-1}$						
Variable	**S&P 500**	**10 Yr. Treasury**	**Volume[1]**	**Fed Funds Futures Volume[1]**	**ARCH (1)**	**GARCH (1)**	**Wald Chi[2] Test**	**Volatility Test**	**Fed Action Test**
VUG	0.95***	0.00	0.08***	1.26***	0.31***	0.36***	56803.89***	21.92***	17.65***
VV	0.99***	0.00	0.19***	1.49***	0.49***	0.13**	346888.82***	67.29***	32.94***
NY	0.89***	0.00	-3.13***	0.97***	0.76***	0.26***	33108.78***	9.02**	6.06**
NYC	1.00***	0.00	0.09	0.50*	0.39***	0.38***	31839.45***	2.11	2.19
JKD	0.89***	0.00	0.93***	0.83***	0.29***	0.40***	47786.80***	10.58***	7.23**
JKE	0.94***	0.00	0.72***	0.71**	0.25***	0.53***	31745.15***	12.25***	4.35
JKF	1.00***	0.00	0.10	1.11***	0.36***	0.41***	30098.61***	9.90***	9.60***
JKG	1.05***	0.00	0.18	1.27**	0.36***	0.56***	25685.28***	7.14**	7.29**
JHK	1.06***	0.01**	0.73***	0.68***	0.20***	0.23**	20648.16***	25.02***	12.81***
JKI	1.06***	-0.01	-0.47*	0.85***	0.39***	0.26***	21139.25***	12.94***	11.12***
JKJ	1.18***	0.00	1.09***	0.69***	0.24***	0.49***	16548.05***	15.79***	4.16
JKK	1.08***	0.01	1.51***	0.40	0.23***	0.57***	12976.32***	6.38**	1.25
JKL	1.23***	-0.01	0.70***	1.28***	0.30***	0.40***	17049.82***	24.61***	21.50***
VDE	1.20***	0.02***	0.26***	1.43***	0.37***	0.37***	7571.37***	21.22***	18.82***
VIS	1.12***	0.00	0.34***	0.85***	0.16***	0.21**	24217.54***	17.92***	14.16***
VNQ	1.21***	-0.01	0.03***	1.41***	0.46***	0.36***	4382.51***	20.74***	13.56***
VOX	0.87***	0.00	0.23***	0.54***	0.20***	0.25*	7397.79***	9.24***	4.53
FXI	1.25***	0.03***	0.01***	0.83***	0.13***	-0.06*	2160.99***	136.43***	23.24***
GLD	0.16***	0.02*	0.01***	0.47***	0.02	-0.01	97.31***	195.45***	12.01***
PEY	0.95***	-0.01***	0.03	2.30***	3.11	0.60***	9839.10***	13.41***	17.38***
PGJ	1.21***	0.03***	0.14***	0.16	0.12***	0.00	5154.52***	65.57***	4.76*
IAU	0.16***	0.02	0.02***	0.92***	0.00	0.00	82.26***	124.65***	33.44***
KLD	0.94***	0.00	0.63	0.52***	0.57***	0.11**	48845.42***	3.87	3.19
PBW	1.41***	0.04***	0.13***	-0.09	0.13***	-0.01	4920.19***	51.49***	5.06*
PWB	0.95***	0.00	0.04**	0.89***	0.31***	0.38***	25567.86***	11.35***	17.03***
PXM	1.00***	-0.01	0.41	0.98***	0.41***	0.35***	16547.92***	8.63**	8.25**
PXSG	1.05***	0.00	0.04	0.83***	0.23***	0.48***	9763.65***	7.88**	-----
PWV	0.93***	0.00	0.04	0.99***	0.35***	0.24**	41325.48***	15.89***	15.76***
PXSV	1.16***	-0.01	0.85***	0.91***	0.24***	0.32***	11165.73***	24.44***	12.63***
VGK	1.19***	0.00	0.01*	1.24***	0.13***	0.61***	9663.66***	12.07***	23.92***
VPL	0.91***	0.00	0.13***	0.95***	0.15***	0.53***	6197.27***	8.63**	11.06***
VWO	1.28***	0.03***	0.00	0.99***	0.15***	0.00	8724.34***	25.77***	28.43***
XLG	0.91***	0.00	0.25***	0.88***	0.14***	0.13*	60117.20***	40.40***	19.74***

	Returns Equation $R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 10YRT_t + \varepsilon_t$		Variance Equation $h_{it} = \alpha_0 + \alpha_1 VOL_{it} + \alpha_2 FFV_t + \alpha_3 \varepsilon_{t-1}^2 + \alpha_4 h_{t-1}$						
Variable	**S&P 500**	**10 Yr. Treasury**	**Volume[1]**	**Fed Funds Futures Volume[1]**	**ARCH (1)**	**GARCH (1)**	**Wald Chi[2] Test**	**Volatility Test**	**Fed Action Test**
PXQ	1.13***	0.02*	0.36	1.67*	0.27***	0.71***	4840.10***	4.05	5.33*
PBJ	0.69***	0.00	0.08***	0.96***	0.20***	0.36***	7769.44***	17.57***	13.66***
PBE	0.91***	0.00	0.55***	0.24	0.26***	0.18*	4684.40***	22.04***	1.05
PEJ	1.03***	-0.01*	0.08	1.13**	0.38***	0.62***	7466.34***	0.16	-----
PBS	1.07***	-0.01*	0.03	1.00***	0.28***	0.37***	11647.65***	12.57***	5.75*
PSI	1.13***	0.01	0.07	0.64	0.12***	0.72***	4742.37***	2.51	1.62
PSJ	0.95***	0.00	0.18	0.92***	0.29***	0.51***	6805.82***	6.70**	5.94*
PJP	0.73***	-0.01	0.12**	0.96**	0.28***	0.59***	6018.86***	4.43	5.31*
EFG	1.06***	0.01	0.29***	1.03***	0.06*	0.18**	13232.42***	61.25***	37.16***
EFV	1.14***	0.00	0.19***	0.91***	0.10***	-0.02	11683.03***	35.73***	28.74***
IWC	1.15***	-0.01	0.28***	0.56**	0.27***	0.42***	14289.33***	23.14***	4.40
PZI	1.18***	-0.01	0.01	0.94**	0.28***	0.60***	10697.32***	3.92	4.61*
PID	0.99***	0.01*	0.04	1.22***	0.33***	0.34***	13723.69***	21.28***	21.51***
PFM	0.82***	0.00*	0.06*	1.22***	0.32***	0.12*	32056.97***	-----	26.98***
FDM	1.19***	-0.01	0.11	0.96***	0.33***	0.45***	8574.66***	8.05**	7.20**
PMR	0.96***	-0.02*	0.04	1.22***	0.23***	0.53***	4905.44***	11.53***	14.37***
PXN	1.08***	0.00	-0.02	1.26*	0.17***	0.73***	6049.50***	6.60**	6.64**
PUI	0.66***	0.00	0.04	0.91***	0.33***	0.47***	4148.46***	7.36**	6.79**
PXJ	1.48***	0.03***	0.23***	0.91***	0.25***	0.21**	6439.59***	27.12***	------
PXE	1.31***	0.02*	0.80***	1.32***	0.32***	0.47***	6117.44***	20.79***	14.69***
PKB	1.28***	0.00	0.41**	0.59*	0.27***	0.52***	9622.66***	4.65*	1.76
PPA	0.96***	0.00	0.02	1.28***	0.24***	0.58***	13280.93***	11.02***	11.27***
RSCO	1.04***	0.00	0.58	0.86***	0.53***	0.27***	14991.76***	7.04**	6.37**
ONEK	0.90***	0.00	-11.79**	1.57***	0.93***	0.34***	15818.18***	13.43***	12.50***
MDYG	1.02***	0.01	0.36	0.69***	0.44***	0.30***	12887.84***	5.47*	5.34*
KIE	1.20***	-0.01**	0.09***	1.34***	1.52	0.52***	10410.12***	17.00***	13.51***
MDYV	0.91***	0.00	-3.78	1.73***	0.59***	0.40***	5497.10***	16.00***	8.79**
KBE	1.37***	-0.02***	0.03***	0.51***	0.20***	0.00	5817.90***	104.94***	10.55***
SDY	0.90***	-0.01**	-0.16*	1.71***	2.54	0.64***	25452.32***	22.14***	14.19***
SLY	1.11***	0.00	-0.07	0.69***	0.22***	-0.02	12571.69***	10.27***	2.41
KCE	1.40***	-0.01	0.09***	0.73***	0.34***	0.36***	13061.27***	25.70***	6.17**
PHO	1.19***	0.00	0.17***	0.35**	0.20***	0.15**	11505.76***	43.03***	2.51
SPHQ	0.87***	0.00	0.00	1.99***	0.65***	0.26***	13674.05***	25.50***	25.40***

	Returns Equation $R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 10YRT_t + \varepsilon_t$		Variance Equation $h_{it} = \alpha_0 + \alpha_1 VOL_{it} + \alpha_2 FFV_t + \alpha_3 \varepsilon_{t-1}^2 + \alpha_4 h_{t-1}$						
Variable	**S&P 500**	**10 Yr. Treasury**	**Volume[1]**	**Fed Funds Futures Volume[1]**	**ARCH (1)**	**GARCH (1)**	**Wald Chi[2] Test**	**Volatility Test**	**Fed Action Test**
FXE	0.17***	0.00	0.04***	0.72***	0.08**	-0.06	396.42***	49.39***	19.21***
PRF	1.02***	0.00*	0.17	1.27**	1.73	0.62***	103699.47***	4.23	5.65*
XHB	1.39***	-0.05***	0.02***	0.98***	0.25***	0.05***	4199.51***	97.25***	30.17***
XSD	1.18***	0.01	0.07	0.70***	0.22***	0.35**	4170.06***	8.80**	8.10**
XBI	0.86***	0.00	0.38***	0.19*	0.06*	-0.01	3155.92***	108.44***	1.81
DBC	0.51***	0.02**	0.01	1.59***	0.29***	0.46***	1023.34***	24.17***	22.51***
RPV	1.17***	-0.01	-11.93**	1.28***	16.17	0.63***	16346.18***	16.08***	6.79**
RPG	1.04***	0.00	0.09	1.28***	0.52***	0.28***	18845.35***	14.38***	4.58
RFV	1.14***	-0.01	-0.98	1.28***	0.67***	0.49***	8316.40***	5.17*	-6.25
RFG	1.09***	0.00	0.12	1.13***	0.30***	0.33***	10239.08***	19.43***	18.57***
RZV	1.33***	-0.01*	0.57***	1.21***	0.39***	0.39***	8115.28***	24.03***	13.79***
RZG	1.03***	0.00	-4.43	1.19***	0.42***	0.43***	5796.60***	12.71***	-----
FDL	0.75***	-0.01***	-7.49**	1.66***	1.11**	0.63***	8292.83***	15.58***	9.45***
USO	0.71***	0.03**	0.01***	0.76***	0.13***	-0.05	712.92***	133.14***	23.94***
FPX	0.92***	0.00	-459.81***	1.48	0.42***	0.63***	8975.40***	13.10***	0.65
QQEW	1.02***	0.00	-0.14	1.19***	0.32***	0.33***	13861.83***	17.89***	17.42***
QTEC	1.07***	0.01	-0.14	1.26***	0.32***	0.41***	7966.35***	14.02***	13.60***
VIG	0.86***	0.00	0.01	1.27***	0.21***	0.46***	57323.75***	18.34***	16.11***
SLV	0.67***	-0.01*	0.01***	0.87***	0.35***	0.22**	6262.14***	18.40***	12.83***
IHI	0.83***	0.01	0.36***	0.69***	0.27***	0.49***	8213.28***	12.15***	5.34*
IAK	1.17***	-0.01	0.38	1.80***	1.64*	0.67***	11390.42***	3.56	-----
IAI	1.35***	-0.01	0.05***	0.56***	0.27***	0.21**	10876.82***	34.03***	5.45*
IEZ	1.44***	0.03***	0.25***	1.08***	0.25***	0.12	5834.44***	39.73***	25.66***
IAT	1.26***	-0.03***	0.45***	1.05***	0.25***	0.00	6643.82***	59.85***	30.48***
IHF	0.82***	0.00	0.36***	0.51***	0.23***	-0.01	4895.68***	32.23***	6.00**
ITA	0.99***	0.01	0.10	1.13***	0.14***	0.58***	11473.67***	13.41***	14.81***
ITB	1.46***	-0.07***	0.01***	1.23***	0.30***	0.41***	3403.86***	15.16***	21.67***
IEO	1.32***	0.03***	0.20***	0.66***	0.23***	0.00	4483.51***	42.99***	14.82***
IHE	0.72***	-0.01	0.24	0.80***	0.26***	0.52***	7320.25***	5.74*	5.46*
GDX	0.77***	0.04*	0.00***	1.00***	0.17***	-0.09*	612.65***	54.13***	-----
RYJ	1.11***	0.00	0.20	1.19***	0.37***	0.43***	14133.23***	14.12***	11.70***
GSP	0.60***	0.03**	0.18**	1.26***	0.26***	0.33***	1048.51***	25.33***	35.23***
DJP	0.43***	0.02**	0.08***	1.15***	0.20***	0.37***	773.07***	25.02***	28.94***

	Returns Equation $R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 10YRT_t + \varepsilon_t$		Variance Equation $h_{it} = \alpha_0 + \alpha_1 VOL_{it} + \alpha_2 FFV_t + \alpha_3 \varepsilon_{t-1}^2 + \alpha_4 h_{t-1}$						
Variable	**S&P 500**	**10 Yr. Treasury**	**Volume[1]**	**Fed Funds Futures Volume[1]**	**ARCH (1)**	**GARCH (1)**	**Wald Chi[2] Test**	**Volatility Test**	**Fed Action Test**
DES	1.15***	-0.01	0.15	1.50***	0.35***	0.50***	12158.19***	15.86***	-----
DOO	1.16***	0.01	0.24*	1.09***	0.25***	0.40***	10385.13***	18.89***	18.18***
DFE	0.94***	0.00	-4.36*	1.15***	0.19***	0.59***	4491.32***	22.85***	10.15***
DNL	0.93***	0.00	0.15	1.17***	0.24***	0.48***	4494.38***	16.37***	15.52***
DLS	0.95***	0.00	0.26**	1.13***	0.16***	0.43***	9157.65***	25.61***	23.69***
AXJL	1.13***	0.02**	0.50***	1.08***	0.21***	0.55***	7380.65***	18.82***	14.37***
DLN	0.90***	0.00	-0.03	1.45***	0.54***	0.28***	59382.54***	16.11***	16.34***
DOL	1.09***	0.01	0.50	1.27***	0.15***	0.57***	11388.44***	21.33***	21.74***
AUSE	1.21***	0.03**	-0.06	1.49***	0.28***	0.57***	5184.61***	12.39***	14.76***
DTN	0.88***	0.00	-0.27	1.67***	0.48***	0.37***	24417.75***	21.74***	18.13***
DFJ	0.66***	0.00	0.35***	0.80***	0.19***	0.53***	1911.84***	9.56***	7.17**
DXJ	0.73***	-0.01	0.02***	0.53**	0.21***	0.53***	2538.06***	20.98***	2.53
DEW	1.03***	0.01	0.13	1.29***	0.42***	0.40***	9008.16***	14.86***	3.89
DTD	0.92***	0.00	0.75**	1.08***	0.54***	0.25***	43879.75***	15.77***	13.22***
DHS	0.86***	-0.01**	0.06	1.63***	0.82***	0.29***	14325.95***	12.80***	------
DON	1.02***	0.00	-0.02	1.56***	0.49***	0.44***	18787.78***	12.69***	6.28**
DIM	1.05***	0.01	0.06	1.15***	0.19***	0.45***	10018.97***	21.32***	21.50***
DTH	1.12***	0.01	0.92***	1.07***	0.16***	0.46***	9890.14***	22.89***	18.74***
DOG	-0.87***	0.00	0.12***	0.73***	0.16***	0.04	37398.97***	34.50***	12.10***
PSQ	-0.95***	0.00	0.00	1.24***	0.25***	0.58***	14402.86***	11.14***	8.96**
MYY	-1.09***	0.00	0.15*	0.76***	0.27***	0.23**	23358.07***	10.81***	8.34**
SH	-0.99***	0.00**	-0.20***	1.43***	1308.23	0.79***	436982.23***	49.31***	11.82***
DDM	1.74***	0.00	0.01***	0.53***	0.12***	-0.06	35616.71***	53.03***	9.23***
QLD	1.91***	0.01	0.00***	0.35***	0.12***	-0.11*	9826.88***	82.21***	4.33
SSO	1.97***	0.00	0.00***	1.95***	0.66***	0.08**	291366.43***	40.96***	25.87***
XES	1.46***	0.03**	0.08	1.36***	0.29***	0.39***	6269.23***	21.87***	22.40***
XPH	0.75***	-0.01	0.13	1.35***	0.30***	0.48***	4573.39***	14.41***	14.98***
XME	1.60***	0.06***	0.02***	0.89***	0.31***	0.47***	4466.24***	12.33***	14.25***
XRT	1.11***	-0.02**	0.01***	1.10***	0.24***	0.15	6087.35***	30.75***	21.30***
KRE	1.30***	-0.03***	0.04***	0.79***	0.19***	-0.01	5537.35***	134.63***	21.94***
XOP	1.37***	0.03***	0.01	1.69**	0.32***	0.61***	4822.85***	6.09**	6.22**
FBT	0.86***	0.00	0.10***	0.41**	0.22***	0.40**	3459.88***	7.88**	2.45
FDN	1.08***	0.00	0.11	1.22	0.22***	0.72***	8163.65***	2.20	-0.70

	Returns Equation $R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 10YRT_t + \varepsilon_t$		Variance Equation $h_{it} = \alpha_0 + \alpha_1 VOL_{it} + \alpha_2 FFV_t + \alpha_3 \varepsilon_{t-1}^2 + \alpha_4 h_{t-1}$						
Variable	**S&P 500**	**10 Yr. Treasury**	**Volume[1]**	**Fed Funds Futures Volume[1]**	**ARCH (1)**	**GARCH (1)**	**Wald Chi[2] Test**	**Volatility Test**	**Fed Action Test**
FXA	0.46***	0.02***	0.14***	1.22***	0.18***	0.49***	2069.30***	17.26***	23.05***
FXB	0.14***	0.00	0.95***	0.41***	0.06**	0.01	301.89***	79.60***	6.32**
FXC	0.30***	0.01**	0.15***	1.01***	0.26***	0.15	1644.95***	27.39***	22.83***
FXS	0.31***	0.00	0.85*	0.86**	0.21***	0.63***	736.87***	5.06*	4.76*
FTCS	0.96***	0.01	0.17	0.80*	0.39***	0.49***	15523.48***	2.37	3.40
GSG	0.59***	0.03**	0.06***	1.44***	0.30***	0.37***	951.70***	31.78***	28.53***
MZZ	-2.16***	0.00	1.34***	0.36**	0.11***	-0.10***	20991.11***	57.30***	4.00
QID	-1.89***	0.00	0.08***	0.09	0.12***	-0.12***	13264.39***	67.65***	0.24
SDS	-1.97***	0.01***	0.00***	1.54***	0.07***	-0.06***	280551.70***	80.88***	80.66***
OIL	0.77***	0.03**	0.07***	0.91***	0.17***	-0.04	960.20***	84.42***	29.54***
VOT	1.10***	0.01*	0.16***	1.24***	0.22***	0.40***	23556.38***	29.07***	23.61***
VOE	1.10***	-0.01*	0.20***	0.89***	0.27***	0.00	40519.01***	30.32***	-----
JXI	0.81***	0.01	0.08	1.06**	0.22***	0.62***	6152.33***	6.22***	7.12**
MXI	1.30***	0.04***	0.04	1.41***	0.27***	0.44***	9450.68***	21.24***	28.18***
EXI	1.08***	0.01	0.04	1.31***	0.27***	0.38***	17106.38***	20.28***	21.78***
KXI	0.67***	0.00	0.24***	0.92***	0.18***	0.13	8543.46***	20.50***	16.98***
RXI	1.02***	-0.01	-0.12	1.41***	0.45***	0.25	11339.78***	18.89***	13.91***
DBV	0.42***	0.01	0.17***	1.63***	0.23***	0.65***	2620.37***	11.97***	-----
PRFZ	1.22***	0.00	0.42***	0.82***	0.27***	0.39***	15530.89***	16.56***	8.40**
EEB	1.32***	0.05***	0.18***	0.57***	0.16***	0.00	6286.36***	40.07***	17.65***
NFO	1.12***	0.01	-109.35***	-0.81	0.96**	0.67***	17459.88***	38.33***	0.91
CVY	0.84***	0.00	-2.28**	0.74*	2.97	0.60***	17415.09***	14.19***	0.98
WMCR	0.92***	-0.01	-21.46*	1.62***	0.50***	0.49***	4120.39***	8.62**	5.35*
EVX	0.87***	0.01	3.00***	0.14	0.27***	0.35**	4900.04***	7.29**	0.98
SLX	1.72***	0.07***	0.27***	0.36**	0.18***	0.14**	6210.47***	44.03***	19.40***
PEZ	0.97***	-0.01	0.36***	1.30***	0.32***	0.58***	5749.35***	5.35*	6.70**
PYZ	1.25***	0.02**	1.09	1.28***	0.31***	0.59***	10943.68***	7.31**	10.50***
PSL	0.64***	0.00	0.43	0.86***	0.31***	0.30***	6773.75***	9.84***	8.01**
PXI	1.20***	0.02**	0.56	1.60***	0.39***	0.48**	6521.01***	14.03***	13.53***
PFI	1.05***	-0.01	1.87***	0.95***	0.41***	0.34***	7886.54***	15.10***	9.69***
PTH	0.79***	0.00	0.07	1.06***	0.31***	0.40	7425.10***	11.77***	11.62***
PRN	1.11***	0.00	-0.05	0.83***	0.24***	0.13	12080.51***	10.82***	10.92***
PTF	0.95***	0.00	0.48	1.25*	0.27***	0.67***	6869.35***	4.01	3.74

	Returns Equation $R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 10YRT_t + \varepsilon_t$		Variance Equation $h_{it} = \alpha_0 + \alpha_1 VOL_{it} + \alpha_2 FFV_t + \alpha_3 \varepsilon_{t-1}^2 + \alpha_4 h_{t-1}$						
Variable	**S&P 500**	**10 Yr. Treasury**	**Volume[1]**	**Fed Funds Futures Volume[1]**	**ARCH (1)**	**GARCH (1)**	**Wald Chi[2] Test**	**Volatility Test**	**Fed Action Test**
PIQ	0.94***	-0.01	-19.54**	0.36	0.64***	0.49***	12017.97***	17.27***	1.03
GNAT	1.21***	0.04***	0.24	1.31***	0.21***	0.49***	6643.26***	21.73***	26.94***
DBU	0.92***	0.02*	0.57***	1.26***	0.28***	0.41***	4047.88***	25.16***	21.51***
CCXE	1.15***	0.03***	0.39*	1.08***	0.21***	0.29**	6064.50***	28.77***	23.61***
PUW	1.28***	0.01*	0.69***	0.85***	0.31***	0.42***	12641.91***	11.75***	7.61**
PZD	1.24***	0.02***	1.49***	0.65***	0.26***	0.00	10131.70***	17.39***	-----
PSP	1.27***	0.00	0.06	1.36***	0.69***	0.40***	9294.49***	12.08***	11.85***
RYH	0.71***	-0.01	-0.49	1.30***	0.34***	0.49***	6098.98***	11.81***	11.69***
RYU	0.55***	0.00	-0.02	1.46***	0.35***	0.50***	2262.93***	11.79***	9.92***
RYE	1.20***	0.02**	0.32	1.66***	0.40***	0.48***	4256.61***	13.88***	16.03***
RGI	0.96***	0.01	-1135.425*	0.26	1.72*	0.67***	6471.24***	17.80***	1.25
RYT	1.03***	0.00	-5.09**	1.28***	0.41***	0.50***	7257.41***	17.55***	6.75**
RTM	1.09***	0.01	0.03	0.92***	0.60***	0.32***	5978.08***	6.63**	-3.24
RYF	1.20***	-0.01	-6.17*	2.10***	381.27	0.42***	7646.59***	17.43***	13.07***
RHS	0.49***	-0.01	-0.15	1.26***	0.31***	0.38***	3154.98***	17.31***	17.49***
RCD	1.05***	-0.01**	0.05	1.39**	4.72	0.53***	7229.28***	5.05*	7.33**
JSC	0.66***	0.00	0.66***	0.31**	0.23***	-0.06*	2243.31***	10.29***	3.11
JPP	0.53***	-0.01	0.63	1.70	0.21***	0.82***	1178.28***	1.86	1.60
VYM	0.89***	0.00*	0.01	1.65***	0.81**	0.57***	44647.70***	11.69***	7.61**
DSI	0.91***	0.00	-20.17*	2.40***	1386.37	0.52***	29297.41***	16.58***	8.51**
FVI	0.67***	0.00	1.94***	1.09***	0.52***	0.38***	3020.53***	11.70***	8.86**
CSD	0.95***	-0.01	0.05	0.61**	0.60***	0.33***	6591.10***	2.38	2.65
DEF	0.62***	0.00	-4.26	1.73***	0.57***	0.52***	8154.78***	13.22***	-0.23
PKW	0.92***	-0.01**	-0.11**	0.82***	0.43***	0.17**	22049.05***	13.87***	11.09***

[1] In 100,000 shares.

*, **, ***, are statistically significant at the 10%, 5%, 1% level respectively.

Dashes denote test did not converge

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